# H.P. TECHNICAL UNIVERSITY HAMIRPUR (HP)



**Syllabus**
**[Effective from the Session: 2012-13]**
**B. Tech. (Textile Engineering)**

# TEXTILE ENGINEERING
## AT
## J.N.GOVT. ENGINEERING COLLEGE,SUNDERNAGAR

(AFFILIATED TO)
H. P. TECHNICAL UNIVERSITY HAMIRPUR H.P.
(GROUP-B)

**Preamble:** The scheme for the course of B. Tech. has been revised keeping in view the required shift in curriculum, arising due to developments in the previous decade and changes foreseen to take place in near future. Since there are certain shortcomings in the ongoing scheme, an effort has been made to remove them as well as incorporate the suggestions received from various corners. The scheme has been prepared keeping in view the guidelines issued by AICTE and industry requirement and social commitments. The scheme has been prepared giving a proper proportionate weight age to basic courses and professional core courses. To embark flexibility in the scheme a number of elective courses have been introduced at an appropriate level. This also provides freedom to students to study courses of his/her interest/ choice of specialization at B.Tech level itself.

| ** | - | @ | # | $ |
|---|---|---|---|---|

** – Stands for the offering Department i.e.
CE for Civil Engineering,
ME for Mechanical Engineering,
EE for Electrical Engineering and Electronics Engineering,
EC for Electronics and Telecommunication Engineering
CS for Computer Science and Engineering,
TE for Textile Engineering
NS for Natural Sciences,
BE for Basic Engineering
HS for Humanities and Social sciences.
@- indicates the Year of Instruction
# - indicates the semester, 1 if odd and 2 if even
$ - indicates subject specific number relating to specialization as given in following table.
It is proposed that the course numbers of these subjects shall remain unchanged. The scheme has been designed keeping in view class strength as 60 students per course. The distribution of the core and other Courses are as follows:-

**Group B contain:**      **Mechanical Engg. (ME)**     **Chemical Engg. (CHE)**
                                   **Aeronautics Engg. (AEE)**   **Textile Engg (TE)**
                                   **Production Engg. (PE)**      **Electrical Engg (EE)**
                                   **Automobile Engg. (AE)**    **Electrical and Electronics Engg. (EEE)**

## Group B

**1st Semester – Scheme and Distribution of Marks**

| Course No. | Subject | L | T | P/D | Hours | Theory End Semester | Theory Sessional | Practical End Semester | Practical Sessional | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| NS-101 | Engineering Mathematics – I | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| NS-102 | Engineering Physics-I | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| HS-101 | Disaster Management and Environmental Science | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| BE-101 | Basic Electrical and Electronics Engineering | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| BE-103 | Engineering Drawing and Graphics | 1 | 0 | 5 | 6 | 100 | 50 | | | 150 |
| BE-105 | Engineering Mechanics | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| NS-105 (P) | Engineering Physics Lab | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| BE-101a (P) | Basic Electrical Engineering Lab | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| BE-101b (P) | Basic Electronics Engineering Lab | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| WS-101 | Workshop Practice-I | 0 | 0 | 3 | 3 | | | 25 | 25 | 50 |
| **Total** | | | | | **35** | **600** | **300** | **100** | **100** | **1100** |

Group B contain:        Mechanical Engg. (ME)     emical Engg. (CHE)
                             Aeronautics Engg. (AEE)   Textile Engg (TE)
                             Production Engg. (PE)      Electrical Engg (EE)
                             Automobile Engg. (AE) Electrical and Electronics Engg. (EEE)

## Group B
**2nd Semester– Scheme and Distribution of Marks**

| Course No. | Subject | L | T | P/D | Hours | Theory | | Practical | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | End Semester | Sessional | End Semester | Sessional | |
| NS-104 | Engineering Mathematics-II | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| NS-105 | Engineering Physics-II | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| NS-103 | Engineering Chemistry | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| HS-102 | Communication and Professional Skills in English | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| BE-102 | Basic Mechanical Engineering | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| BE-104 | Principles of Computer Programming & $C^{++}$ | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| NS-103 (P) | Engineering Chemistry Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| HS-102 (P) | Communication and Professional Skills Lab-I | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| BE-104 (P) | Computer Programming Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| WS-102 | Workshop Practice-II | 0 | 0 | 3 | 3 | | | 25 | 25 | 50 |
| **Total** | | | | | **35** | **600** | **300** | **100** | **100** | **1100** |

## 3<sup>rd</sup> Semester

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| Course No. | Subjects | Periods | | | Contact Hours | Exam Schedule | | Practical Schedule | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | External | Internal | External | Internal | |
| HS-201 | Engineering Economics | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| NS-206 | Engineering Mathematics -III | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-211 | Textile Machines and Processes | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-212 | Textile Fibres | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-213 | Yarn Manufacture-I | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-214 | Fabric Manufacturing-I | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| TE-211 (P) | Textile Machines and Processes Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-213 (P) | Yarn Manufacture-I Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-214 (P) | Fabric Manufacturing-I Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| **TOTAL** | | **18** | **6** | **6** | **30** | **600** | **300** | **75** | **75** | **1050** |

**4<sup>th</sup> Semester**

| Course No. | Subjects | Periods | | | Contact Hours | Exam Schedule | | Practical Schedule | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | External | Internal | External | Internal | |
| HS-203 | Human Values and Professional Ethics | 2 | 0 | 2 | 4 | 100 | 50 | | | 150 |
| NS-207 | Numerical Methods for Engineers | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-221 | Properties of Fibres | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-222 | Man made Fibres | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-223 | Yarn Manufacture-II | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-224 | Fabric Manufacture-II | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| HS-222 (P) | Oral and Written Communication Skills Lab-II | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-223 (P) | Yarn Manufacture-II Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-224 (P) | Fabric Manufacture –II Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-225 (P) | Textile Fibre Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| ECA-201 | Extra Curricular Activity | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| **TOTAL** | | **17** | **5** | **12** | **34** | **600** | **300** | **125** | **125** | **1150** |

Field Visit shall be compulsory to all students of 2<sup>nd</sup> year once in a year during or after 4<sup>th</sup> semester.

For students of Textile Engg branches, a community project at this level will be conducted. The Evaluation of same shall be done during 5<sup>th</sup> Semester.

**5<sup>th</sup> Semester**

| Course No. | Subjects | Periods | | | Contact Hours | Exam Schedule | | Practical Schedule | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | External | Internal | External | Internal | |
| HS-311 | Principles of Management a Critical Thinking | 3 | 0 | 2 | 5 | 100 | 50 | | | 150 |
| TE-311 | Theory of Textile Machines | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-312 | Textile Chemical Processing-I | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE -313 | Textile Testing-I | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE -314 | Non Woven Technology | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE- 315 | Textile Design and Analysis | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| TE- 312 (P) | Textile Chemical Processing-I Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-313 (P) | Textile Testing -1 Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-315 (P) | Textile Design and Analysis Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| HS-300 | Community Project | 0 | 0 | 0 | 0 | | | 25 | 25 | 50 |
| **TOTAL** | | **18** | **5** | **8** | **31** | **600** | **300** | **100** | **100** | **1100** |

## 6th Semester

| Course No. | Subjects | Periods | | | Contact Hours | Exam Schedule | | Practical Schedule | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | External | Internal | External | Internal | |
| **-300 | Open Elective | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-321 | Textile Testing-II | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-322 | Theory of Textile Structures | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-323 | Textile Chemical Processing-II | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-324 | Garment Technology | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-325 | Fabric Manufacture-III | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| TE-321 (P) | Textile Testing-II Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-323 (P) | Textile Chemical Processing-II Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-324 (P) | Garment Manufacturing Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| **TOTAL** | | **18** | **5** | **6** | **30** | **600** | **300** | **75** | **75** | **1050** |

$$ - Industrial Training of 8 weeks duration after 6th Semester
**Open Elective to be opted from list below but one which is not offered by his Department**

| Sr. No. | Open Elective | Sub. Code |
|---|---|---|
| 1. | Energy Assessment and Auditing | EE-300 |
| 2. | Total Quality Management | ME-300 |
| 3. | Optimization methods for Engineering System | NS-300 |
| 4. | Remote Sensing & GIS | CE-300 |
| 5. | Operating Systems | CS-300 |

## 7th Semester

| Course No. | Subjects | Periods | | | Contact Hours | Exam Schedule | | Practical Schedule | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | External | Internal | External | Internal | |
| TE-411 | Elective-I | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-412 | Process Control in Textiles | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-413 | Mechanics of Textile Process | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-414 | Non Conventional Yarn Manufacture | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-415 | Post Spinning Operations | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-416 | Apparel marketing and Merchandising | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| TE- 417 (P) | Fabric Manufacturing -III Laboratory | 0 | 0 | 2 | 2 | 1 | | 25 | 25 | 50 |
| TE-496 | Industrial Training Viva $$ | 0 | 0 | 0 | 0 | | | 50 | 50 | 100 |
| TE-498 | Project Phase -1 | 0 | 0 | 4 | 4 | | | 50 | 50 | 100 |
| **TOTAL** | | **18** | **6** | **6** | **30** | **600** | **300** | **125** | **125** | **1150** |

During winter break there shall be a field visit compulsory to all students of 7th semester, 4th year

**Elective-I**

TE-411 (a)   Fashion Designing

TE-411 (b)   Woolen Technology

TE-411 (c) Textile Product and Design

TE-411 (d) Advanced Fabric Structure and Design

TE-411(e). High Performance Fibres

**8<sup>th</sup> Semester**

| Course No. | Subjects | Periods | | | Contact Hours | Exam Schedule | | Practical Schedule | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | External | Internal | External | Internal | |
| TE-421 | Elective-II | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-422 | Mill Management and Maintenance | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-423 | Knitting Technology | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| TE-424 | Technical Textiles | 3 | 1 | 0 | 4 | 100 | 50 | | | 150 |
| **(Practicals / Drawing / Design)** | | | | | | | | | | |
| TE-423 (P) | Knitting Technology Laboratory | 0 | 0 | 2 | 2 | | | 25 | 25 | 50 |
| TE-426 | Project Phase -2 | 0 | 0 | 6 | 6 | | | 200 | 100 | 300 |
| GP-400 | General Proficiency | 0 | 0 | 0 | 0 | | | 100 | | 100 |
| TE-426 | Seminar and GD | 0 | 0 | 2 | 2 | | | | 50 | 50 |
| **TOTAL** | | **12** | **4** | **10** | **26** | **400** | **200** | **325** | **175** | **1100** |

**Elective-II**

TE-421 (a) Processing of Man-made Fibres and Blended  Textile

TE-421 (b) Eco Friendly Textile Processing

TE-421 (c) Marketing and Financial Management in Textiles

TE-421 (d) Manufacturing of Specialty Textile

TE -421(e) Process & Quality Control in Apparel Manufacturing

| B.Tech in Textile Engineering | | |
|---|---|---|
| **Semester** | **Contact Hours** | **Total Marks** |
| 1<sup>st</sup> | 35 | 1100 |
| 2<sup>nd</sup> | 35 | 1100 |
| 3<sup>rd</sup> | 30 | 1050 |
| 4<sup>th</sup> | 34 | 1150 |
| 5<sup>th</sup> | 31 | 1100 |
| 6<sup>th</sup> | 30 | 1050 |
| 7<sup>th</sup> | 30 | 1150 |
| 8<sup>th</sup> | 26 | 1100 |
| **Total Marks** | **251** | **8800** |

# SEMESTER 1

## Engineering Mathematics-I (NS-101)

| Course Code | NS-101 | Credits- 04 | L - 3, T- 1, P - 0 |
|---|---|---|---|
| Name of Course | Engineering mathematics-I | | |
| Lectures to be delivered | 52  (L-39, T-13 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### Section-A
**MATRICES**

Matrices, Related matrices, Complex matrices (Hermitian and skew-Hermitian matrices, Unitary matrix), Consistency of linear system of equations, Rank of a matrix, Normal form of a matrix, Vectors, Linear dependence, Consistency of a linear system of equations, System of linear homogeneous equations, Linear and orthogonal transformations, Characteristic equation, Eigen values, Eigen vectors, Properties of Eigen values, Cayley-Hamilton theorem, Quadratic forms and its reduction to canonical form.

### Section-B
**DIFFERENTIAL CALCULUS**

Indeterminate forms, Taylor's and Maclaurin's series, Partial Differentiation and its geometrical interpretation, Homogeneous functions, Euler's theorem and its extension, Total differentials, Composite function, Jacobian, Maxima and minima of functions of two variables, Method of undetermined multipliers.

### Section-C
**INTEGRAL CALCULUS**

*Reduction formulas, Quadrature, Rectification, Surface and Volume of revolution for simple curves, Double integrals and their applications, Change of order of integration, Change of variables, Triple integrals and their applications, Change of variable, Beta and Gamma functions and their relationship.*

## COMPLEX NUMBERS

*Applications of De Moivre's theorem, Root of a complex number, Exponential, Circular, Hyperbolic and Logarithmic functions of a complex variable, Inverse Hyperbolic functions, Real and imaginary parts of Circular and Hyperbolic functions, Summation of the series-'C+iS' method.*

## Text BOOKS

1. Advanced Engineering Mathematics: by Erwin Kreyszig, John Wiley and Sons, NC, New York.
2. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.

## *REFERENCE BOOKS*

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill
2. Differential & Integral Calculus: by N. Piskunov, MIR Publications.
3. Calculus and Analytic Geometry, by Thomes, G.B, Finney, R.L. Ninth Edition, Peason Education.
4. Advanced Engineering Mathematics, by Peter. V. O" Nil, Wordsworth Publishing Company.
5. Advanced Engineering Mathematics, by Jain, R.K and Lyengar, S.R.K., Narosa Publishing Company.
6. Higher Engineering Mathematics, by Grewal, B.S., Khanna Publishers, New Delhi.
7. Engineering Mathematics, by Taneja, H.C., Volume-I & Volume-II, I.K. Publisher.

# Engineering Physics-I (NS-102)

| Course Code | NS-102 | Credits-4 | L-3, T-1, P-0 |
|---|---|---|---|
| Name of the Course | Engineering Physics-I | | |
| Lectures to be Delivered | 52 (1 Hr Each) (L=39, T=13 for each semester) | | |
| Semester End Examination | Max Marks: 100 | Min Pass Marks: 40 | Maximum Time: 3 hrs |
| Continuous Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | Max Marks: 50 | |

**Instructions**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

## Section A

*Interference-Coherent Sources, Two Beam Interference by Division of Wavefront- Fresnel Biprism Interference by Division of Amplitude - Newton's Rings, Michelson Interferometer.*

*Diffraction-Fraunhoffer Diffraction, Diffraction Through Single Slit, Plane Transmission Grating, Fresnel Diffraction, Fresnel Half Period Zone, The Zone Plate.*

*Polarization- Production of Polarized Light, Malus's Law, Double Refraction, Interference of polarized Light: Quarter Wave Plate And Half Wave Plate.*

## Section B

**Particle Properties of Waves:** Electromagnetic Waves, Maxwell Equations, Blackbody radiations, Photoelectric Effect, Compton Effect, Pair Production,

**Waves Properties of Particles:** De Broglie waves, Phase velocity, group velocity and Particle velocity. Relation between phase velocity and group velocity. Relation between group velocity and particle velocity. Particle Diffraction, Heisenberg's uncertainty principle and its physical significance (no derivation). Application of uncertainty principle (Non-existence of electron in the nucleus).

## Section C

**Quantum Mechanics:** Postulates of quantum mechanics, The Wave Euation. Properties and Physical significance of a wave function. Probability density and Normalisation of wave function. , Schrodinger's equation: Time- Dependent form, Expectation Values, Operators, Schrodinger's equation: Steady- Stateform Eigen values and eigen function, Application of Schrödinger wave equation –Particle in a box, FinitePotential well, Tunnel Effect, Harmonic oscillator.

## Section D

**Nuclear Structure:** Composition of nucleus, Nuclear Properties, Stable Nuclei, binding energy, Liquid Drop Model, Nuclear Forces.

**Nuclear Reactions:** Cross-section, Nuclear fission, moderators, nuclear reactors, Nuclear fusion in Stars, Fusion Reactors

**Elementary Particles:**Leptons,Hadrons, Elementary particle quantum numbers, Quarks, Field Bosons,

**Cosmology:** The Big Bang Theory, Evolution of Stars.

**Text Books**:
1. A.Ghatak: Optics,Tata Mcgraw Hill, 3rd edition.
2. Arthur Beiser, Concepts of Modern Physics ,6th Edition, Tata Mcgraw Hill-2009

**Reference Books:**
1. David J Griffith , Introduction to Electrodynamics, Pearson Prentice Hall.
2. Halliday, Resnick and Walker- Principles of Physics, Wiley India 9th Edition-2012

## DISASTER MANAGEMENT AND ENVIRONMENTAL SCIENCE (HS-101)

| Course Code | **Hs-101** | L-3, T-1, P-0 | |
|---|---|---|---|
| Name of the Course | **Disaster Management and Environmental Science** | | |
| Lectures to be delivered | **52 (1 Hr Each) (L = 39, P = 13 for each semester)** | | |
| **Semester End Examination** | Max. Time = 3 hrs. | Max. Marks: 100 | Min. Pass Marks: 40 |
| **Continuous Assessment** (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | **Max. Marks: 50** | |

*INSTRUCTIONS:*

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

### Section-A

Principles of Disaster Management. Natural Disasters such as Earthquake, Floods, Fire, Landslides, Tornado, Cyclones, Tsunamis, Nuclear, Chemical, Terrorism, Extra Terrestrial and other natural calamities. Hazards, Risks and Vulnerabilities. Assessment of Disaster Vulnerability of a location and vulnerable groups, National policy on disaster Management,

### Section-B

Prevention, Preparedness and Mitigation measures for various Disasters, Post Disaster Relief & Logistics Management, Emergency Support Functions and their coordination mechanism, Resource & Material Management, Management of Relief Camp, Information systems & decision making tools, Voluntary Agencies & Community Participation at various stages of disaster, management, Integration of Rural Development Programmes with disaster reduction and mitigation activities.

### Section-C

Renewable and non-renewable resources, Role of individual in conservation of natural resources for sustainable life styles. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining, Dams and their effects on forest and tribal people. Use and over exploitation of surface and ground water resources, Floods, Drought, Conflicts over water, Dams- benefits and problems. Causes, effects and control measures of Air pollution, Water pollution, soil pollution, Noise pollution, Thermal pollution, Nuclear hazards.

### Section-D

Global Environmental crisis, Current global environment issues, Global Warming, Greenhouse Effect, role of Carbon Dioxide and Methane, Ozone Problem, CFC's and Alternatives, Causes of Climate Change Energy Use: past, present and future, Role of Engineers.

**TEXT BOOKS:**
1. Disaster Management By G. K. Ghosh A.P.H. Publishing Corporation
2. Environmental Studies, R Rajgopalan, Oxford University Press

**REFERENCE BOOKS:**
1. Modern Encyclopaedia of Disaster and Hazard Management By B C Bose Rajat publications.
2. Disaster Management By R.B. Singh Rawat Publications.
3. Disaster Management By B Narayan A.P.H. Publishing Corporation.
4. Environmental Studies, Daniels, Wiley Publication
5. Environmental Studies, Basak, Pearson Publication

# Basic Electrical & Electronics Engineering (BE-101)

| Course Code | BE-101 | | L-3, T-1, P-0 |
|---|---|---|---|
| **Name of the Course** | **Basic Electrical & Electronics Engineering** | | |
| **Lectures to be delivered** | **52 (1 Hr Each) (L = 39, T = 13 for each semester)** | | |
| **Semester End Examination** | **Max. Time: 3 hrs.** | Max. Marks: 100 | Min. Pass Marks:40 |
| **Continuous Assessment** (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | | Max. Marks: 50 |

## Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which willcover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus andeach question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

## SECTION A

**DC circuits:**. Ohm's law , resistance, receptivity, series & parallel connections, star delta transformation, power dissipation in resistance, effect of temperature on resistance. Kirchhoff's laws Mesh laws; Mesh & Nodal analysis.

**AC circuits**: Generation of alternating voltage &currents, Sinusoidal signals, instantaneous  and peak values, R.M.S. &Average value, phase angle, polar and rectangular, exponential and trigonometric representations of RL and C components,

**Electrical Instruments and Devices:** Voltmeter, Ammeter, Wattmeter, Energy meter, Inverters.
Introduction to Domestic Electric Wiring

## SECTION – B

**Series and Parallel Circuits:** A.C.Through resistance; inductance & capacitance. R-L; R-C & R-L-C series & parallel circuits, phasor diagrams. Power & power factor, series & parallel resonance. Problems by analytical as well as physical methods.

**Three phase circuits:** Three phase voltage & current generation, star & delta connections (balanced load), relationship between phase &line currents and voltages, phasor diagrams, measurement of power by two wattmeter methods.

**A.C. And D.C. Machines:** Principle, construction and working of transformer. Introduction to D.C and A.C. machines.

## SECTION – C

**Semiconductor Devices & Circuit:** Classification of material; Energy band structure of conductors, insulators & semiconductor ;Classification of Semiconductor Mobility and conductivity, Intrinsic and extrinsic semiconductors and charge densities in semiconductors, current components insemiconductors, continuity equation. ; PN junction Characteristics& Analysis ;diode rating ; Types of diodes – Zener diodes, Photodiodes, Light emitting diodes (LED's), Varactor diodes and tunnel diodes. Rectifiers and filter circuit: Half wave, full wave and Bridge rectifier circuits and their analysis, L, C and Pi filters, Basic regulator supply using zener diode.

**Transistors:** Construction and characteristics of bipolar junction, transistors (BJT's)-Comm. Base, Comm. emitter, Comm. Collector configuration.

**Field Effect Transistor:** Construction and characteristics of JFET.MOSFET construction and characteristics.

**Integrated Circuits:** Classification Of ICs; Monolithic ICs; OP Amp: Characterstics of Ideal OPAmp& application

**Electronic Instruments**: Role and importance of general purpose test Instruments, Electronic Millimeter, Cathode Ray Oscilloscope, Measurement of amplitude, Frequency and phase using CRO.

**TEXT BOOKS:**
1. Basic Electrical & Electronics Engineering –V  Jegathesan , K Vinoth Kumar & R Saravanakumar, Wiley India
2. Basic Electrical & Electronics Engineering- B.L.Thereja

**REFERENCE BOOKS:**
1. Electronics devices and circuit theory by Robert Boylestad.
2. Electronics Devices and circuits by Millman&Halkias, TMH.
3. Basic Electronics by Debashis De, Pearson Education, 2010.
4. Electronics devices and circuit by Bhargava and Kulshtreshta, TTTI Series
5. Fundamentals of Electrical & Electronics Engg.,2$^{nd}$ Edition by Smarajit Ghosh, PHI Learning Private Limited.

# ENGINEERING DRAWING AND GRAPHICS  (BE-103)

| Course Code | **BE-103** | L-1, T-0, P-5 | |
|---|---|---|---|
| Name of the Course | **Engineering Drawing and Graphics** | | |
| Lectures to be delivered | **78 (1 Hr  Each)  (L = 13, P = 65 for each semester)** | | |
| **Semester End Examination** | Max. Time = 3 hrs. | Max. Marks: 100 | Min. Pass Marks: 40 |
| **Continuous Assessment** (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | **Max. Marks: 50** | |

*INSTRUCTIONS:*

1. **For Institutes:** There will be two sessions per week. 1st session will consist of one lecture and two hours of practice session. 2nd session will consist of three hours of practice session.
2. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
3. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

## Section-A

**Drawing Techniques and Scales:** Various type of lines, principal of dimensioning, size and location as per IS code of practice (SP-46) for general Engg. Drawing. Practice of drawing, various types of lines and dimensioning exercises. Drawing exercises pertaining to symbols.Conventions and Exercise of lettering techniques.Free hand printing of letters and numerals in 3, 5, 8 and 12 mm sizes, vertical and inclined at 75 degree.Instrumental lettering in single stroke.Linear scale, Diagonal scale &vernier scale.

**Points, Lines and Planes:** Projection of Points, Lines and Planes: Concept of horizontal and vertical planes. First and third angle projections: projections of point and lines, true length of lines and their horizontal and vertical traces, projection of planes and their traces. Auxiliary planes.

## Section-B

**Projections of Solids:** Right regular solids of revolution and polyhedrons etc. and their auxiliary views.

**Sectioning of Solids:** Principal of sanctioning, types of sanctioning and their practice on projection of solids, sectioning by auxiliary planes.

## Section-C

**Development of Surfaces:** Development of surfaces of cylinders, cones, pyramid, prism etc. exercises involving development of unique surfaces like Y-piece, hopper, tray, truncated pieces etc.

**Intersection of Surfaces:** Intersection of cylinders, cones and prisms with their axes being vertical, horizontal or inclines. Exercise on intersection of solids-cylinder and cylinder, cylinder and cone, prism and prism.

## Section-D

**Isometric Projection:** Concept of isometric views: isometric scale and exercise on isometric views. Practice of Orthographic projections.

**Simple Trusses:** Graphical Method.

**TEXT BOOKS:**
**1.**     Engineering Drawing & Engg. Graphics byP. S. Gill, Kataria and Sons Millennium Edition.
**2.**     Engineering Drawing Plane and Solid Geometry byN.D. Bhatt and V. M. Panchal, 44th Edition, 2002, Charotar Publishing House.

**REFERENCE BOOKS:**
    **1.**  Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill.

# ENGINEERING MECHANICS (BE-105)

| Course Code | BE – 105 | L-3, T-1, P-0 | |
|---|---|---|---|
| Name of the Course | Engineering Mechanics | | |
| Lectures to be delivered | 52 (1 Hr Each)  (L = 39, T = 13, P=0 for each semester) | | |
| Semester End Examination | Max. Time = 3 hrs. | Max. Marks: 100 | Min. Pass Marks: 40 |
| Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | | Max. Marks: 50 |

*INSTRUCTIONS:*

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus, and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

## Section-A

**Force, Moment, Center of gravity & Moment of Inertia:** Idealization of Mechanics, Concept of Rigid Body and Elastic Body, Laws of Mechanics, Forces & System of Forces, Composition, Resolution & resultant of Forces, Laws of Forces, Lami's Theorem, Moment & Couples, Varignon's Theorem, Free Body Diagram, Centre of Gravity of a Lamina, Centroids of various Geometric Shapes, Moment of Inertia, Radius of Gyration, Parallel and Perpendicular Axis Theorem.

**Frames and Trusses:** Introduction, Perfect Frame, Redundant Frame, Reactions of Supports, Plane Trusses, Space Trusses, Method of Joints, Method of Section, Graphical Method- Maxwell Diagram.

## Section-B

**Simple Stresses and Strains:** Stress & strain; Types of stresses and strains Elastic limit; Hooks law; Stress – strain diagram for ductile and brittle material, Factor of safety; Poisson's ratio; Elastic constants; Young's modulus, Shear modulus & Bulk modulus. Relationship between elastic constants. Thermal Stress & Strain.

**Shear Force and Bending Moment:** Concept of beams - statically determinate and indeterminate beams, Concept and definition of shear force and bending moment, Sign conventions, Types of load – concentrated, uniformly distributed, uniformly varying, Types of beams: Cantilever beam, simply supported beam, overhanging beam; Shear force and bending moment diagrams for the above beams subjected to different loadings and couples. Point of contra flexure, Relationship between load, Shear force and bending moment.

## Section-C

**Bending Stresses in Beams:** Bending Stresses in Beams with derivation of Bending equation and its application to beams of circular, rectangular I & T Section, Composite beams.

**Shearing Stresses in Beams:** Shearing stress at a section in a loaded beam, Shear stress distribution over different sections.

**Section-D**

**Torsion of Circular Shaft:** Introduction, Theory of Pure torsion - Derivation of torsion equation, assumptions made in theory of pure torsion, Maximum torque transmitted by Solid and hollow shafts, Polar modulus, Torsion rigidity, Power transmitted by a shaft, Comparison of hollow and solid shaft subjected to pure torsion,Close coiled helical spring subjected to axial load and torque.

**Introduction to Friction:** Definition, Principles of friction, Friction between solid bodies, Coefficient of friction, Kinetic friction force, Definition & Determination of angle of friction, Laws of friction , Procedure for friction analysis, Equilibrium of rigid bodies subjected to frictional force of resistance, Friction at the ends of ladder, Wedge friction, Remedial measures in overcoming friction.


**TEXT BOOKS:**
**1.** Engineering Mechanics-Nelson, McGraw Hill
**2.** Engineering Mechanics: Statics, Meriam, JohnWiley

**REFERENCE BOOKS:**
**1.** Mechanics of Materials-E.J. Hearn, Elsevier
**2.** Engineering Mechanics-Bhavikatti, New Age International
**3.** Engineering Mechanics- JagatBabu, Pearson
**4.** Engineering Mechanics, P.N. Chandramouli,PHI Learning Private Limited.
**5.** Engineering Mechanics,V. Jayakumar & M. Kumar, PHI Learning Private Limited.

# Engineering Physics Lab (NS-105(P))

| Course Code | NS-105(P) | | L-0, T-0, P-2 |
|---|---|---|---|
| Name of the Course | Engineering Physics Lab | | |
| Lectures to be Delivered | 26 hours of Lab. work (2 hrs. per week) | | |
| Semester End Examination | Max Marks: 25 | Min Pass Marks: 10 | Maximum Time: 3 hrs |
| Continuous Assessment | Lab work  30%,   Lab Record        25% Viva/ Hands on 25%, Attendance        20% | | Max     Marks: 25 |

**Instructions for paper setter / candidates**

Laboratory examination will consist of two parts:

      Performing a practical exercises assigned by the examiner .

      Viva-voce examination

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

## List of Experiments

1. To find the refractive index  of a prism by using spectrometer.
2. To find the wavelength of sodium light by Newton's rings experiment.
3. To find the wavelength of sodium light by Michelson interferometer.
4. To study the laser beam characterstics like, wavelength using diffraction grating aperture & divergence.
5. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
6. To find the value of e/m for electrons by Helical method.
7. To compare the capacitances of two capacitors by De'sauty Bridge.
8. To find the value of Planck's constant by using a photoelectric cell.
9. To calculate the hysteresis loss by tracing a B-H curve for a given sample
10. To determine the Hall co-efficient
11. To determine the band gap of an intrinsic semiconductor by four probe method.
12. To find the velocity of ultrasound in liquid.
13. To find out polarizability of a dielectric substance.
14. To determine the numerical Aperture of an optical fibre.
15. To determine the attenuation & propagation losses in optical fibres.

**Note: Each student is required to perform at least ten experiments.**

**Books:**
1. Practical Physics-S.L.Gupta&V.Kumar.
2. Advanced Practical Physics Vol. I & II – S.P. Singh

# BASIC ELECTRICAL ENGINEERING LAB (BE– 101a(P))

| Course Code | **BE– 101a(P)** | | L-0, T-0, P-2 |
|---|---|---|---|
| Name of the Course | **Basic Electrical Engineering Lab** | | |
| Lectures to be Delivered | 26 hours of Lab. work (2 hrs. per week) | | |
| Semester End Examination | Max Marks: 25 | Min Pass Marks: 10 | Maximum Time: 3 hrs |
| Continuous Assessment | Lab work30%, Lab Record           25%<br>Viva/ Hands on 25%, Attendance           20% | | Max Marks: 25 |

## Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:
1. Performing a practical examination assigned by the examiner
2. Viva-voce examination
Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

## LIST OF EXPERIMENTS

**1.** To verify KCL and KVL.
**2.** To study various types of Electrical Meters.
**3.** To perform open circuit and short circuit test of Transformer.
**4.** Measurement of power by Three Voltmeter/Three Ammeter method.
**5.** Measurement of power in 3-phase system by two wattmeter method.
**6.** To perform direct load test of transformer and plot efficiency v/s load characteristics.
**7.** To perform direct load test of the DC shunt generator and plot load v/s current curve.
**8.** To study frequency response of series RLC circuit and determine resonance frequency and Q factor for various values of R,L,C.
**9.** To study frequency response of parallel RLC circuit and determine resonance frequency and Q factor for various values of R,L,C.

**Note:** All the practicals of Electrical should also be performed on breadboard.

# BASIC ELECTRONICS ENGINEERING LAB (BE– 101b(P)

| Course Code | **BE– 101b(P)** | Credits-2 | L-0, T-0, P-2 |
|---|---|---|---|
| Name of the Course | **Basic Electronics Engineering Lab.** | | |
| Lectures to be Delivered | 26 hours of Lab. work (2 hrs. per week) | | |
| Semester End Examination | Max Marks: 25 | Min Pass Marks: 10 | Maximum Time: 3 hrs |
| Continuous Assessment | Lab work 30%, Lab Record 25% Viva/ Hands on 25% Attendance 20% | | Max Marks: 25 |

## Instructions for Paper setter/ Candidates

Laboratory examination will consist of two parts:

1. Performing a practical examination assigned by the examiner
2. Viva-voce examination

Viva-voce examination will be related to the practicals performed/projects executed by the candidate related to the paper during the course of the semester.

## LIST OF EXPERIMENTS

1. Familiarization with electronic components, and general purpose Laboratory equipment.
2. Use of CRO and function generator and calculation of amplitude, frequency, time period of different types of ac signals.
3. Verification of Junction Diode and Zener Diode characteristic and determination of static and dynamic resistance at the operating point
4. Verification of input and output characteristics of a Bipolar Junction Transistor and determination of the operating point on load line.
5. Verification of input and output characteristics of a Field Effect Transistor and determination of the operating point on load line.
6. Verification of Series and Parallel Resonance theory.
7. Operation of diode as different form of rectifier and effect of different types of passive filters on the output.
8. Determination of frequency response of a RC coupled amplifier and determination of bandwidth and signal handling capacity.
9. Use of OP-AMP as an inverting and non-inverting amplifier for different gains.
10. Verification of Uni-junction Transistor characteristics and relaxation oscillator
11. Rectifiers- Half wave , Full wave & Bridge rectifiers

**Note:** All the practicals should be performed on breadboard.

# WORKSHOP PRACTICE-I (WS-101)

| Course Code | WS– 101 | L-0, T-0, P-3 |
|---|---|---|
| Name of the Course | Workshop Practice –I | |
| Lectures to be delivered | 39 hours of Lab sessions in each semester | |
| Semester End Examination | Max. Marks: 25 | Min. Pass Marks: 10 |
| Continuous Assessment | Lab work 30%,       Lab record 25%, Viva 25%,             Attendance 20% | Max. Marks: 25 |

**INSTRUCTIONS:**

Laboratory examination will consist of two parts:
(i) Performing a practical exercises assigned by the examiner .
(ii) Viva-voce examination
Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

**List of Experiments: -**

**Fitting Shop: -**
Introduction to the tools used in Fitting Shop and various processes in Fitting shop.
1. To make a square piece of mild steel.
2. To make V-matching joint of mild steel.
3. To make a V-notch.

**Machine Shop: -**
Introduction to various machine tools and machine parts, such as Lathes, drilling machine, grinders etc. Cutting tools and operations.
1. Facing and turning on mild steel rod on Lathe Machine.
2. To make a groove on lathe machine.
3. Taper turning operation on Lathe Machine.

**Carpentry and Pattern making Shop: -**
Carpentry and Pattern Making Various types of timber and practice boards, defects in timber, seasoning of wood, tools, operations and joints. Introduction to the tools used in carpentry shop.
1. To make the 'T' lap joint.
2. To make 'T' Dove-tail joint.
3. To make Mortise &Tennon joint.

**Welding Shop: -**
Introduction to different welding methods, welding equipment, electrodes, welding joints, awareness of welding defects.

1. To make a lap joint.
2. To make a T joint.
3. To make a V-butt joint.

**Smithy and Forging: -**

Introduction to forging tools, equipments, and operations, Forgability of metals.

1. To make a ring of mild steel by cold forging process.
2. To make S-hook by hot forging process.
3. To make chisel by hot forging process.

**Foundry Shop: -**

Introduction to moulding materials, moulds, use of cores, melting furnaces, tools and equipment used in Foundry.

1. Make a single piece pattern mould.
2. To make spilt pattern mould.
3. To make mould and core and assemble it.

**Electrical and Electronics Shop: -**

Demonstration of tools, Introduction to electric wiring, Exercises preparation of PCBs, involving soldering of electrical & electronic application.

1. Fault rectification, disassembly and assembly of (any two) electrical appliances viz. electric iron, electric mixer, ceiling and table fan, tube light, blower and water heater.
2. Demonstration and use of flowing electronic instruments: multimeter, voltmeter, ammeter, energy meter, CRO.

**Suggested Reading: -**

1. Workshop Technology by Chapman.
2. Manufacturing Processes by Begman.
3. Manufacturing Materials and processes by JS Campbell.
4. Workshop Practice-I,Mechanical Workshop Practice, 2<sup>nd</sup> Edition by John, PHI Learning Private Limited.

| Course Code | NS-104 | | L - 3, T- 1, P - 0 | |
|---|---|---|---|---|
| Name of Course | Engineering mathematics-II | | | |
| Lectures to be delivered | 52  (L-39, T-13 for each semester) | | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. | |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | | MM: 50. |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## Section-A

**INFINITE SERIES:**Convergence and divergence of infinite series, Geometric series test, Positive term series, p-series test, [Comparison test, D'Alembert's ratio test, Cauchy's root test (Radical test), Integral test, Raabe's test, Logarithmic test, Gauss's test] (without proofs), Alternating series and Leibnitz's rule, Power series, Radius and interval of convergence, absolute convergence and Conditional convergence.

## Section-B

**FOURIER SERIES:** Euler's formula, Conditions for a Fourier expansion, Dirichlet's conditions, Functions having points of discontinuity, Change of interval, Odd and even periodic functions, Expansion of odd and even periodic functions, Half-range series, Typical wave-forms, Parseval's formula.

## Section-C

**LINEAR DIFFERENTIAL EQUATIONS:** Brief review of first order ordinary differential equations, Exact equations, Equations reducible to exact equations, Equations of the first order and higher degree, Clairaut's equation, Linear differential equations with constant co-efficients, Complimentary functions and particular integral, Method of variation of parameters, Equations reducible to linear equations with constant co-efficients (Cauchy's and Legendre's linear equations).

## Section-D

**VECTOR CALCULUS:** Curves in space, curvature and torsion, Scalar and vector point functions, Differentiation of vectors, Vector operator Del, gradient, divergence and curl with their physical interpretations, Formulae involving gradient, divergence and curl, Line, surface and volume integrals, Green's Theorems, Stokes and GaussTheorems and their verifications and applications. Scalar potential, solenoidal and irrotational fields.

**TEXT BOOKS**

1. Advanced Engineering Mathematics by ErwinKreyszig, John Wiley and Sons, N.C., New York.
2. Advanced Engineering Mathematics by R. K. Jain & S. R. K Iyengar, Narosa Publishing House.

**REFERENCE BOOKS**

1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill
2. Higher Engineering Mathematics byB S Grewal,Khanna Publishers, New Delhi.
3. Differential & Integral Calculus: by N. Piskunov, MIR Publications.
4. Calculus and Analytic Geometry by Thomes, G.B, Finney, R.L. Ninth Edition, Pearson Education.
5. Advanced Engineering Mathematics byPeter. V. ONil, Wordsworth Publishing Company.
6. Vector Calculus by C. E. Weatherburn.  John Wiley and Sons, NC, New York.
7. Differential Equations by Shepley L. Ross, John Wiley & Sons, New York.

# Engineering Physics– II(NS – 105)

| Course Code | *NS-105* | | L-3, T-1, P-0 |
|---|---|---|---|
| Name of the Course | *Engineering Physics– II* | | |
| Lectures to be delivered | *52 (1Hr.each)  (L = 39, T = 13 for each semester)* | | |
| Semester End Examination | *Max. Time: 3 hrs.* | *Max. Marks: 100* | Min. Pass Marks: 40 |
| Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | Max. Marks: 50 | |

*Instructions*
1.      **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2.      **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

## SECTION – A

**Crystal Structure**: Space lattice, Bravais lattice - unit cell, primitive cell. Lattice parameters. Crystal systems. Direction and planes in a crystal.Miller indices. Expression for inter-planar spacing.Co-ordination number.  Atomic packing factor. Bragg's Law.Determination of crystal structure by Bragg's x-ray spectrometer.  Crystal structures of NaCl, and diamond.

**Free electron theory:** Elements of classical free electron theory and its limitations. Quantum theory of free electrons, Fermi level, density of states, fermidirac distribution function, Thermionic emission, Richardson's equation.

**(10 Lectures) & (Text Book-1)**

## SECTION – B

**Band Theory of Solids**: Origin of energy bands, Periodic Potential in a crystal, Wave function in a periodic potential, kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Effective mass of electron, Concept of negative effective mass and holes, Classification into metals, semiconductors and insulators, fermi energy and its variation with temperature.

**(9 Lectures) & (Text Book-1)**

## SECTION – C

**Dielectric and Magnetic Properties of Materials:** Dielectric polarization, dielectric constant, types of polarization, electric field, electric displacement and dielectric polarization vector & relation between them, Gauss;s law in the presence of dielectric, Behavior of dielectric in alternating field- simple concepts, Atomic Magnetic Moments, Classification of magnetic materials, Dia, para, and ferromagnetic materials, domains,  B-H graph in ferromagnetic materials Anti-ferromagnetism &ferrimagnetisms, . Soft and Hard magnetic materials.  Ferrite and their applications.

**Superconductivity:** Temperature dependence of resistivity in superconducting materials. Effect of magnetic field (Meissner effect). Type I and Type II superconductors. BCS theory (qualitative), High temperature superconductors, Applications of superconductivity.

**(12 Lectures)  & (Text Book-1)**


## SECTION – D

**Lasers:** Spontaneous and stimulated emission, Einstein's Coefficients, Characteristics of Laser beam, Population inversion, Pumping Techniques, Components of a laser system, Ruby Laser and He-Ne Lasers

**Fiber Optics**: Basics of fiber optics, Total Internal Reflection, Acceptance angle, Numerical aperture, Single mode & Multimode fibres, Step index and Graded index fiber,  pulse Dispersion in optical fibres, Attenuation in Optical Fibres, applications of optical fibres.

**(8 Lectures) & (Text Book-2)**


**Text Books**:
1. Rajnikant: Applied Solid State Physics, Wiley India Pvt Ltd.
2. A. Ghatak: Optics,Tata Mcgraw Hill, 3$^{rd}$ edition.

**Reference Books:**
1. Charles Kittel: Introduction to Solid State Physics, John Wiley & sons Inc.
2. S. O. Kasap, Principle of Electronic materials and Devices.

# ENGINEERING CHEMISTRY (NS – 103)

| Course Code | NS-103 | Credits- 04 | L-03, T-01, P-0 | |
|---|---|---|---|---|
| Name of Course | Engineering Chemistry | | | |
| Lectures to be delivered | 55 (L-42, T-13 for each semester) | | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. | |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %) | | | | MM: 50. |

**Instructions**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

## SECTION –A

**Electrochemistry:** Electrical Conductance, Types of Electrolyte, Specific Conductance, Equivalent Conductance, Molar Conductance, Ionic Conductance (Kohlrausch Law), Factors Affecting Conductance, Transport Number, Interionic Attraction Theory of Conductance, Hydration of ions, Electrochemical Cell ,Electrode Potential, Standard Electrode Potential, Galvanic Cells, EMF of the Cell & Free Energy Change, Nernst Equation, Reference Electrodes (S.H.E,Calomel Electrode, Silver-Silver Electrode, Eletrochemical Series, Glass Electrode, Concentration Cell, types & applications of Concentration Cell, Batteries(primary cell, Secondary storage cell, Metal- Air Batteries), Fuel cell, hydrogen-oxygen fuel cell.

**Phase Rule:** Introduction, One Component System (water system, sulpher system) Two components System (lead-silver & Zinc- magnesium system), thermal Analysis.

## SECTION – B

Water Treatment: Introduction, Sources of water, Impurities, Hardness Analysis, Oxidations, (BOD & COD), Boiler Corrosion Sewage & Treatment.

**Corrosion and its Controls:** Introduction, Types of corrosions, Electrochemical Theory, Pitting, Water Line, Differential Aerations corrosions, Stress Corrosions, Factors affecting Corrosions, Preventive measures.

## SECTION – C

**Instrumental Methods of Analysis**

Introduction to spectroscopy; UV-Visible spectroscopy- Absorption laws ,Instrumentation, formation of absorption bands, Theory of electronic spectroscopy, Chromophore and auxochrome concept, fluorescence & phosphorescence, application of UV-Visible spectroscopy ;  IR spectroscopy- Principle, theory of molecular vibrations, important features of IR spectroscopy and applications; NMR-Principle, relaxation processes, Instrumentation, Shielding-desheilding effects, spin coupling, coupling  constant, applications  of  NMR.

**Fuel and Combustion:** Introduction, class of fuels ( Solid, Liquid and Gases) Coal and its origin, Analysis of Coals, Petroleum fuels, Cracking, Reforming, Octane no, Cetane no, Gaseseous fuel – Water gas, producer gas, bio gas, coal gas and oil gases

## SECTION – D

**Polymers** Classification of polymers, types of polymerizations, plastics, some important commercial thermoplastics (polythene, polypropylene, polystyrene, polyvinylchloride, Teflon, plexiglass, polyurethanes), thermosetting (Bakelite, epoxy resin, Urea formaldehyde)  Elastomers- synthetic rubbers, synthetic fibers.

**Composite Materials**
Introduction, Classification, Constituents of composites, Fiber reinforced composites, unidirectional fibre reinforced composites, short fibre reinforced composites, particle reinforced composites, important types of particulate composites, Failures of fiber reinforced composites, Advantages and applications of composites.

**Text BOOKS:**
1. Engineering Chemistry by Dr Ramesh Thakur and Dr.Subba Ramesh, Wiley India publisher
2.  A Text Book of Engineering Chemistry by ShashiChawla, DhanpatRai& Sons.

*REFERENCE BOOKS:*
1. Engineering Chemistry by P C Jain & Monika Jain
2. Fundamental of organic spectroscopy by Y. R. Sharma
3.  Spectroscopic methods by Williams and Fleming

# Communication & Professional Skills in English (HS-102)

| Course Code | HS-102 | Credits-3 | L-3, T-1, P-0 |
|---|---|---|---|
| Name of the Course | Communication & Professional Skills in English | | |
| Semester End Examination | Max Marks: 100 | Min Pass Marks: 40 | Maximum Time: 3 hrs |
| Continuous Assessment (based on Sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | | Max Marks: 50 |

### Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For Candidates:** Candidates are required to attempt five question in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E.

## Section A
**Essentials of communication:**
The process of communication: communication competence, types and channels of communication – verbal and non-verbal, Importance of listening skills in communication: types of listening, barriers to listening, Barriers to communication and removal of these barriers, personal SWOT Analysis, Analyzing audience, role of emotions and body language in communication.

## Section B
**Written communication:**
Enriching vocabulary, using vocabulary in different context, Essentials of strong writing skills, language and style of writing, characteristics of a good technical style, logical reasoning, Paragraph writing, Developing perspective: goals, objectives and principles of critical thinking.

## Section C
**Reading Comprehension:**
Importance of reading: Eye movement, fixations, regression, visual wandering, right approach to reading, SQ3R method of reading, Precis writing, Comprehension, Essay writing.

## Section D
**Technical Communication:**
Report writing: Importance, structure, drafting of reports, Business Writing: Sales letters, claim and adjustment letters, inviting/sending quotations, Tenders, Memorandum, Job Application letter, Preparing a personal resume, notices, agenda and minutes of meeting.

**TEXT BOOKS:**
1. An Introduction to Professional English and Soft Skills: by Bikram K. Das, Kalyani Samantray, Cambridge Press.
2. Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan

*REFERENCE BOOKS:*
1. Communication Skills, Sanjay Kumar and PushpLata, Oxford University Press.
2. Chrissie Wright (Ed.); Handbook of Practical Communication Skills; JAICO Books
3. Effective Communication and soft Skills, NitinBhatnagar and MamtaBhatnagar, Pearson Publication.
4. Communicative English for Engineers and professionals, NitinBhatnagar and MamtaBhatnagar, Pearson Publication.
5. Communication Skills and soft skills- An integrated approach, Kumar, Pearson Publication
6. Communication Skills for Engineers, Mishra, Pearson Publication
7. K.K.Sinha, Business Communication, Galgotia Publishing Company, New Delhi, 1999.
8. R.K.Bansal& J.B. Harrison, spoken English for India, Orient Longman.

*Recommended Readings:*

1. Business @ The Speed of thought, Bill Gates.
2. My Experiments with Truth, M.K.Ghandhi
3. Wings of Fire, A.P.J. Kalam
4. An Autobiography, JwaharLal Nehru.

# BASIC MECHANICAL ENGINEERING (BE-102)

| Course Code | **BE-102** | L-3, T-1, P-0 | |
|---|---|---|---|
| Name of the Course | **Basic Mechanical Engineering** | | |
| Lectures to be delivered | **52 (1 Hr Each) (L = 39, T = 13 for each semester)** | | |
| Semester End Examination | Max. Time = 3 hrs. | **Max. Marks: 100** | **Min. Pass Marks: 40** |
| Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | **Max. Marks: 50** | |

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus, and each question will carry 20% of the total marks of the semester end examination for the course.
   **Note:** The paper setter will be required to mention a note in the question paper that use of steam table, graphical plots are permitted.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

## Section-A
**Basic concept:** Dimensions and units, thermodynamic systems, thermodynamic properties and process, thermodynamic equilibrium, energy-kinetic, potential and internal, heat and work, zeroth law, concept of temperature, definition of ideal gas, laws and properties of ideal gas.

**First law of Thermodynamics:** First law for control mass (closed system), internal energy as a property, enthalpy, specific heats, non-flow processes of ideal gases, cyclic process, first law for control volume (open system), applications of steady flow energy equation to engineering devices.

## Section-B
**Second law of Thermodynamics:** Limitations of first law of thermodynamics, Kelvin- Planck and Clausius statements, their equivalence, application of statements of second law to heat engine, heat pump and refrigerator, reversible processes, reversible cycles, and carnot cycle, corollaries of the second law, thermodynamics temperature scale, Clausius inequality, entropy, principle of increase of entropy, availability and irreversibility.

**Properties of Steam:** Phase transformation, phase diagram, condition of steam- saturated steam, dry-saturated steam, wet steam, superheated steam, dryness fraction, property of steam, steam tables, use of Mollier charts , process of vapors and various process.

## Section-C
**Gas Power Cycles:** Carnot, Diesel, Otto, Dual combustion, working of 2-stroke and 4-stroke engine, Air standard thermal efficiency, Concepts of mean effective pressure, indicated power and brake powerfor reciprocating engines.

**Introduction of Psychometry:** The Gibbs Dalton law, Psychometric terms, Introduction of Psychometry Chart.

**Introduction to Heat Transfer:** Mechanisms – Conduction, Convection and Radiation, Introduction to Fourier's Law of heat conduction, Newton's law of cooling, Stefan-Boltzmann law.

**Introduction to Fluid Mechanics:** Fluid, properties of fluid, viscosity, Newton's law of viscosity, surface tension, types of fluid, buoyancy.

**TEXT BOOKS:**
1.      Basic Mechanical Engineering by Basant Aggarwal and CM Aggarwal Wiley India.
2.      Fundamentals of Mechanical Sciences: Engineering Thermodynamics and Fluid Mechanics by Mukherjee and Paul, PHI Learning.

**REFERENCE BOOKS:**
1.      Thermodynamics – An Engineering Approach (SI Units) – Yunus. A. Cengel, Michael A. Boles, TMH New Delhi
2.      Fundamentals of Thermodynamics –Sonntag, Borgnakke Van Wylen – Wiley India.
3.      Engineering Thermodynamics by P.K. Nag, TMH, New Delhi
4.      Thermodynamics by C.P. Arora, TMH, New Delhi
5.      Fundamentals of Mechanical Engineering,2<sup>nd</sup> Edition by G.S. Sawhney, PHI Learning Private Limited.

# Principle of Computer Programming & C++ (BE-104)

| Course Code | BE-104 | Credits-4 | L-3, T-1, P-0 |
|---|---|---|---|
| **Name of the Course** | *Principle of Computer Programming & C++* | | |
| **Lectures to be Delivered** | 52 (1 Hr Each) (L=39, T=13 for each semester) | | |
| **Semester End Examination** | Max Marks: 100 | Min Pass Marks: 40 | Maximum Time: 3 hrs |
| **Continuous** Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | | **Max Marks: 50** |

## SECTION-A

**Introduction to Computer**:-Definition, Characteristics..Generation of Computers, Capabilities and Limitations.Introduction to Operating System.Basic Components of a Computer System-Control Unit, ALU, Input/output functions and characteristics. Memory Introduction, Classifications- Volatile Memory and Non- Volatile , Memory, ROM, RAM.

**Input, Output and storage Units**:-Computer Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, and Joystick, Light Pen, Scanners, Various types of Monitors.

**Hard Copy Devices**:- Impact and Non- Impact Printers- Daisy Wheel, Dot Matrix, Line Printer, Chain Printer. Non Impact Printers- DeskJet, Laser Printer, Virus : General introduction of virus and anti-virus
.

## SECTION-B

**High Level Language and Low Level Language**, Software and its different types- System Software, Application software.Compiler, Interpreter and Assembler. Introduction to algorithm and Flow chart: - Representation of an algorithm, flowchart symbols and flow chart, rules, advantage and limitations of flowchart and pseudo code. Testing and Debugging:-Definition of testing and debugging , types of program errors.

**DOS :** Internal and External Commands , Difference between External and Internal Commands.

## SECTION-C

**Introduction to C++ :**Starting with C++, Features of C++ Procedure-oriented programming OOP vs. procedure-oriented programming Compiling, linking and running a C++ program.

**Object-Oriented Programming Concepts:** Abstraction , Inheritance, Polymorphism, Data Binding , Encapsulation., Classes and Objects Concept of a class ,Defining a class, Creating an object , Object Scope.

**The Basics of C++ :**Basic Data Types, User-defined Data Types, Variable Declarations, Variable Names Constants and its types , Character  Constants , String Constants, Standard input  and standard output Formatted input –cin and   Formatted output – cout.

**Working with Operators and Expressions:** Operators, Arithmetic Operators, Relational   Operators, Assignment Operator, Logical Operators, Increment and Decrement Operators (++ and --), 'Operate-Assign' Operators (+=, =, ...).

## SECTION-D

**Controlling the Program Flow:** Decision control : if, if – else, if - else if . Loop Control :  while, do – while, for, break,continue Case Control switch, goto.

**Functions/Procedures:** function,Returning values from functions,Arguments Passed by ValuePassing Addresses of Arguments,Concept of variable scope and scope rules,Global variables

**Pointers and Arrays:** Pointers,Pointer Initialization,Pointer Operators ,The & (and) Operator Understanding Arrays, Initializing Arrays.

**Files:** reading, writing text and binary files, pointers, character pointers, pointers to arrays, arrays ofpointer to structures.

**TEXT BOOKS:**
1. Fundamentals of Computers by Rajaraman, V., PHI Publication
2. Object oriented programming in $C^{++}$ by Rajesh K. Shukla, Wiley India.

*REFERENCE BOOKS*

1. The C++ programming language ,Bjarne Stroustrup ,Addison Wesley , 2000.
2. Basic Computer Engineering, Kogent learning solution Inc. Dreamtech Press.
3. Object oriented programming Principles and Fundamental, Gim Keogh and Mario Giannini, John Wiley.
4. Object oriented programming in turbo $C^{++}$ ,Robbet Lofre, 4 Ed Pearson Publication.
5. Programming with $C^{++}$, D. Ravichandern, Tata Mcgraw Hill 1996.
6. Object oriented programming in C++, Nicolai M Josuetis, John Wiley.

# Engineering Chemistry Lab (NS-103(P))

| Course Code | NS-103(P) | Credits-2 | L-0, T-0, P-2 |
|---|---|---|---|
| Name of the Course | Engineering Chemistry Lab | | |
| Lectures to be Delivered | 26 hours of Lab. work (2 hrs. per week) | | |
| Semester End Examination | Max Marks: 25 | Min Pass Marks: 10 | Maximum Time: 3 hrs |
| Continuous Assessment | Lab work          30%  Lab Record          25% <br> Viva/ Hands on   25% Attendance          20% | | Max Marks: 25 |

**Instructions for paper setter / candidates**

Laboratory examination will consist of two parts:

Performing a practical exercises assigned by the examiner.

Viva-voce examination

Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

**NOTE: At least 10 to 12 experiments to be performed.**

**List of Experiments**

1. To determine the surface tension of the given liquid by drop number method by using stalgmometer and identify the given liquid.

2. To determine the insoluble, soluble and total solids in given sample of sewage.

3. To determine the solid carbon, volatile matter, ash content and percentage of moisture in given sample of coal by proximate analysis method and classify the coal.

4. To determine the total alkalinity in a given sample of water using a standard acid.

5. To determine the percentage of Chlorine in a given sample of $CaOCl_2$ which has been dissolved in one litre of solution..

6. To determine the surface tension of the two given unknown liquids by using Stalgmometer and identify the given liquid.

7. To determine the coefficient of viscosity of the given unknown liquids by using Ostwald's Viscometer and identify the given liquid.

8. To determine the coefficient of viscosity of the given lubricating oil using Red Wood Viscometer

9. To determine the coefficient of viscosity of the given lubricating oil using Seybolt Viscometer.

10. To determine the flash point and fire point of given sample of oil using Pens key Marten's apparatus.

11. To determine the amount of Chlorine in given sample of water approximate N/20 sodium Thiosulphate solution.

12. To determine the maximum wavelength of solution of cobalt chloride

13. To determine the Beer's Law and apply it to find the concentration of given unknown solution by spectra-photometer.

14. To determine the chemical oxygen demand of waste water.

15. To determine the half-life period of given radioactive sample using GM counter.

# Communication & Professional Skills Lab-I (HS-102(P))

| Course Code | HS-102 (P) | Credits-2 | | L-0, T-0, P-2 |
|---|---|---|---|---|
| Lectures to be Delivered | 26 hours of Lab. work (2 hrs. per week) | | | |
| Semester End Examination | Max Marks: 25 | Min Pass Marks: 10 | | Maximum Time: 3 hrs |
| Continuous Assessment | Lab work          30%  Viva/ Hands on  25% | Lab Record       25%  Attendance       20% | | Max Marks: 25 |

**Instructions for paper setter / candidates:**

Laboratory examination will consist of two parts:
- (i) Performing a practical exercises assigned by the examiner .
- (ii) Viva-voce examination

Note: Each practical should be performed twice for effectiveness.

**List of Practicals:**

1. Word processing a document.
2. Power point presentations.
3. Resume / Biodata preparation
4. Report writing.
5. Preparing notice, agenda and minutes of meeting.
6. Preparation of Quotation and tender document
7. Note making based reading comprehension
8. Précis Writing

**Recommended books:**

1. English Conversation Practice by Grant Taylor
2. Business correspondence and Report Writing: by R. C. Sharma & Krishna Mohan
3. Chrissie Wright (Ed.); Handbook of Practical Communication Skills; JAICO Books.
4. Veena Kumar, The Sounds of English, Makaav Educational Software, New Delhi.

# Computer Programming Laboratory (BE-104(P))

| Course Code | BE-104 (P) | | L-0, T-0, P-2 |
|---|---|---|---|
| Name of the Course | Computer Programming Laboratory | | |
| Lectures to be Delivered | 26 Hrs. of Lab work (2hrs. each per week) | | |
| Semester End Examination | Max Marks: 25 | Min Pass Marks: 10 | Maximum Time: 3 hrs |
| Continuous Assessment | Lab work 30% Viva 25% | Lab Record 25%, Attendance 20% | Max Marks: 25 |

1. Write a Program to find the sum, difference, product and quotient of two integers.
2. Write a program C++ Program to output an integer, a floating point number and a character.
3. Write a program to switch between different cases.
4. Write a program to count the number of words and characters in a sentence.
5. Program to find the roots of a quadratic equation.
6.
   - Create a class rational which represent a numerical value by two double values numerator and Denominator include the following public members functions
   - Constructor with no argument(default)
   - Constructor with two arguments
   - Void reduce ()that reduce the rational number by eliminating the highest common factor between the numerator and the denominator
   - Overload + operator to add two rational numbers
   - Overload >> operator to enable input through cin.
   - Overload << operator to enable input through cout.

7. Write a program to convert days into years and weeks.
8. Write a program to convert temperatures from Celsius to Fahrenheit and vice versa.
9. Write a program to find the sum of either of the diagonals of a 4 x 4 matrix.
10. Write a program to enter a sentence and output the number of uppercase & lowercase consonants, uppercase & lowercase vowels in sentence.
11. Write a program to enter 10 integers in a single-dimension array and then print out the array in ascending order.
12. Write a program to find the sum of each row & column of a matrix of size n x m and if matrix is square, find the sum of the diagonals also.
13. Write a program to display fibonacci series upto n terms.
14. Write a program for payroll system using inheritance.
15. To calculate the total mark of a student using the concept of virtual base class.
16. Program for Write File Operation Using C++ Programming.
17. Write a program that creates a binary file by reading the data for the student for the terminal .The data of each student consist of roll number, name (a string of thirty or lesser number of characters ) and marks.
18. Write a program to read a number and display its square, square root, cube and cube root. Use a virtual function to display any one of the above.
19. Write a program to read two matrix and find their product use operator overloading so that the statement for multiplying the matrix may be written as Z=x*y where x,y,z are matrices.

# WORKSHOP PRACTICE-II (WS-102)

| Course Code | WS– 102 | L-0, T-0, P-3 | |
|---|---|---|---|
| Name of the Course | Workshop Practice -II | | |
| Lectures to be delivered | 39 hours of Lab sessions in each semester | | |
| Semester End Examination | | Max. Marks: 25 | Min. Pass Marks: 10 |
| Continuous Assessment | Lab work 30%, Lab record 25%, Viva 25%, Attendance 20% | | Max. Marks: 25 |

**INSTRUCTIONS:**

Laboratory examination will consist of two parts:
(i) Performing a practical exercises assigned by the examiner .
(ii) Viva-voce examination
Viva-voce examination will be related to the practicals performed / project executed by the candidate related to the paper during the course of the semester.

**List of Experiments: -**

**Fitting Shop: -**
1. Drilling and Tapping in a M.S. piece.
2. To make a male-female joint (Taper type) of mild steel.

**Machine Shop: -**
1. To perform boring operation on lathe machine.
2. To perform knurling and threading operation on lathe machine.
3. Step turning operation on a lathe machine.

**Carpentry and Pattern making Shop: -**
1. To make a single piece pattern of connecting rod.
2. To make a self-cod pattern.
3. To make a split pattern.

**Welding Shop: -**
1. To make a V butt joint in horizontal position.
2. To make a V butt joint in vertical position.
3. To perform Gas welding operation.

**Smithy and Forging: -**
1. To make a cube from a circular bar.
2. To make a tong using hot forging operations.
3. To perform drawing down operation.

**Foundry Shop: -**
1. To make a mould and perform casting operation.
2. Study of casting defects and its remedies.

**Sheet Metal Working Shop: -**
Blanking and piercing die construction, press work materials, strip layout, bending dies, forming dies, drawing operations, single and double action draw dies.
1. To make a Ring by Piercing.
2. To make a square shaped object by Bending and Forming Operation.
3. To Draw a Wire.

**Suggested Reading: -**
1. Workshop Technology by Chapman
2. Manufacturing Processes by Begman
3. Manufacturing Materials and Processes by J. S. Campbell

## ENGINEERING ECONOMICS (HS-201)

| Course Code | **HS-201** | L-3, T-1, P-0 | |
|---|---|---|---|
| Name of the Course | **Engineering Economics** | | |
| Lectures to be delivered | **39 (1 Hr  Each)  (L = 39 for each semester)** | | |
| **Semester End Examination** | Max. Time = 3 hrs. | Max. Marks: 100 | Min. Pass Marks: 40 |
| **Continuous Assessment** (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | | **Max. Marks: 50** | |

**INSTRUCTIONS:**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

### Section-A

**Economics**: Definition, nature and scope of economics, need &significance of economics in Engineering, Economic Systems- Meaning of capitalism, socialism and mixed economy

**Demand:** Meaning, determinants of demand, demand curve, law of demand, exception to the law of demand, increase &decrease in demand, contraction &extension of demand, Elasticity of demand, Methods of measuring Elasticity of demand

**Supply**: Law of supply, extension &contraction of supply, increase & decrease in Supply, Elasticity of supply

### Section-B

**Cost of Production**: Concept, types, Relation between average & marginal cost.

**Theory of Production**: Laws of returns- Law of variable proportions and law of returns to Scale, Break Even Analysis.

**Price & Output Determination**: Price determination under perfect competition, monopoly, monopolistic competition &oligopoly.

### Section-C

**Monetary policy**- Meaning, objectives, methods, Fiscal policy- Meaning &Objectives of fiscal policy In a developing country like India, Functions of Reserve Bank of India and commercial banks.

**Economics & Business Environment**- Business/Trade Cycles- Meaning, Characteristics & classification, Inflation Effect, Foreign capital &economic development, Engineering Economics Analysis, Economics Analysis in the public and regulated sectors.

### Section D

**Indian Economy:** - Characteristics of Indian economy, Planning in India, Development &Growth in India. Overall Economic policy since independence, Input & output analysis, Problem of unemployment in India. Concept of sustainable development &inclusive growth in India. Policy of globalizations, liberisation & privatization. Analysis of state &union budgets.

**TEXT BOOKS:**
1. Modern Micro Economics  by Koutsoyannisa, MC Millen
2. Principles of Engineering Economics Analysis by John A. White,  Kenneth E. Case  and David B. Pratt Wiley India

**REFERENCE BOOKS:**
1. Business Economics by K. P. M. Sundharam,  Sultan Chand &Sons
2. Elementary Economics Theory by K.K Dewett & J. D. Verma, S.Chand Publication

# ENGINEERING MATHEMATICS-III (NS-206)

| Course Code | NS-206 | L-03, T-01, P-0 | |
|---|---|---|---|
| Name of Course | Engineering Mathematics-III | | |
| Lectures to be delivered | 52 (L-39, T-13 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

## Section-A
## 1. PARTIAL DIFFERENTIAL EQUATIONS
Formation and solutions of partial differential equations, Lagrange's linear equation of the first order, non linear equations of first order,  charpit method,  Homogenous linear partial differential equation with constant coefficients, rules for complementary function and particular integral, non-homogenous linear partial differential equations, Method of separation of variables, Solution of wave equations, Heat flow equations, Laplace's equations and their applications to engineering problems.

## Section-B
## 2. SPECIAL FUNCTIONS:
Power series solution of differential equations, Frobenius method, Bessel's equation, Bessel functions of the first and second kind, Recurrence relations of Bessel functions, Generating functions, Orthogonality of Bessel functions, Legendre's equation, Legendre polynomial, Recurrence relations of Legendre's functions, Rodrigue's formula, Orthogonality of Legendre polynomials, Error function and its properties.

## Section-C
## 3. INTEGRAL TRANSFORMS
Laplace Transforms of standard functions and their properties, Inverse Laplace Transforms, General Properties of inverse Laplace transforms and Convolution Theorem, Laplace Transforms of periodic functions, Laplace transform of Bessel functions and Error function, Dirac-delta Function, Heaviside's Unit Function, Applications to linear simultaneous differential equations. Fourier Integral, Fourier Transform, Fourier sine and cosine transforms, finite Fourier transform, Convolution theorem for Fourier Transform and Parseval's Identity for Fourier Transform.

## Section-D
## 4. FUNCTIONS OF COMPLEX VARIABLE
Limit and derivative of complex functions, Cauchy-Riemann equations, Analytic functions, Entire functions and its applications, Conformal mapping and standard transformations, Complex integration, Cauchy's theorem and Cauchy's integral formula (without proof),  Series of complex terms,

Taylor's series and Laurent's series (without proof), Zeros of analytic functions, isolated singularity, removable singularity, Poles, essential singularity, Residue, Residue theorem and their applications

**TEXT BOOKS**
1. Advanced Engineering Mathematics: by Erwin Kreyszig . John Wiley and Sons, NC, New York.
2. Partial Differential Equation for Engineers and Scientists: by J.N. Sharma and Kehar Singh Narosa Publishing House, New Delhi/ Alpha Science Int. Ltd, UK.
3. Advanced Engineering Mathematics: by R. K. Jain & S. R. K Iyengar, Narosa Pub. House.
4. Complex Variables Theory and Applications: by HS Kasana, PHI Learning Private Limited New Delhi, (2008).

**REFERENCE BOOKS**
1. Advanced Engineering Mathematics: by C. R. Wylie & L. C. Barrett, McGraw Hill.
2. Elements of Partial Differential Equations: by Ian N. Sneddon, McGraw-Hill, Singapore.
3. Differential & Integral Calculus: by N. Piskunov, MIR Publications.
4. Calculus and Analytic Geometry, by Thomes, G.B, Finney, R.L. Ninth Edition, Peason Education.
5. Advanced Engineering Mathematics,by Peter. V. O. Nil, Wordsworth Publishing Company.
6. Advanced Engineering Mathematics, by Jain, R.K and Lyengar, S.R.K., Narosa Publishing Company.
7. Higher Engineering Mathematics, by Grewal, B.S., Khanna Publishers, New Delhi.
8. Engineering Mathematics, by Taneja, H.C., Volume-I & Volume-II, I.K. Publisher.
9. Differential Equations: by Shepley L. Ross, John Wiley & Sons, New York.

## Textile Machines and Processes (TE-211)

| Course Code | TE-211 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Textile Machines and Processes** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50% , Tutorials /Assignments 30% ,quiz /Seminar 10% ,Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**General**: Topic including job and entrepreneurial opportunities of textile technologist, general nomenclature related to textile.  Flow chart of conversion of fiber into finished garment.

**Numbering system**: Direct and indirect system, relationship among different numbering systems.

**Fibres**: Classification of natural and manmade fiber, basic requirement of fiber forming polymer and fibres. Elementary idea of polymerization, crystallinity and orientation.

### SECTION -B

**Yarn formation**: Objectives of spinning, conventional and non conventional methods of yarn formation. Elementary idea of conversion of fiber into yarn, the objectives all the processes  and machineries involved in it viz. blow room, card, comber, draw frame, speed frame, ring frame. Function of twist on plied yarns. Different methods for the production of synthetic yarn. Difference between staple and filament yarn.

**Preparatory process**: Objectives of winding, doubling, warping, beam and sectional warping, sizing drawing in process.

### SECTION -C

**Fabric formation**: Weaving, knitting and non-woven. Idea of conventional and non conventional weaving, basic motions of weaving, basic weaves and designs.

**Chemical processing**: Elementary ideas of singeing, desizing, scouring, bleaching, mercerization. Dyeing: classification and brief methodology its type. Printing: various methods and styles of printing, introduction to J-box, padding mangle, jigger, winch.

### SECTION -D

**Finishing**: Different types of finishes provided to fabric according to end use.

**Garment manufacturing**: Garment industry and general nomenclature of garment industry. Main processes required for conversion of fabric into finished garment.

**TEXT  BOOKS**

1. Gohl E P G and Valensky, "*Textile Science*," 2nd Ed., CBS Publisher, New Delhi (1999).
2. Shenai V A, "*Textile fiber*", Vol.1, 2nd Ed., Sevak Publication, Bombay (1991)

**REFERENCE BOOKS**

1. Pattabhiram T K, "*Essential Elements of Textile calculations*", 3rd Ed., Mahajan Publishers Ahmedabad (1985).
2. Klein W, "*Manual of Textile Technology*", Vol.1, 1st Ed., The Textile Institute, Manchester (1995).
3. Trotman E R, "*Dyeing and Chemical Technology of Textile Fibres*", Charles Griffin and Co. Ltd, London (1975).

**Textile Fibers (TE-212)**

| Course Code | TE-212 | L=3  T=1   P=0 | | |
|---|---|---|---|---|
| Name of the course | Textile Fibers | | | |
| Lectures to be delivered | 52 (1 Hr Each )(L=39,T=13 for each semester) | | | |
| Semester End Examination | Max.Time: 3hrs | Max Marks :100 | Min Marks :40 | |
| Continuous assessment (based on sessional tests 50% , Tutorials /Assignments 30% ,quiz /Seminar 10% ,Attendance 10%) | Max Marks :50 | | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed..

## SECTION -A

**INTRODUCTION:** Historical Evolution of Textiles. Definition of Textiles, Fibre, Staple fibre, Filament, Yarn, Thread, Fabric and Clothing.  Characteristics of Textile Fibre. Classification of Textile Fibre.

**CELLULOSIC FIBRES: Cotton –** Varieties: Genetically modified Cotton, Organic Cotton & Coloured Cotton, Cultivation and harvesting, Chemical composition, Chemical structure, Physical properties, Chemical properties and uses. **Jute**-Cultivation, Retting, Fibre Extraction, Properties and uses.

## SECTION -B

**PROTEIN FIBRES: Wool** – Types, Fibre extraction,  Chemical Composition, Chemical structure, Physical properties,  Chemical properties and uses.
**Silk** – Types, Production of Raw silk, Wild silk, Spun silk, Chemical composition,  Chemical structure, Physical properties,  Chemical properties and uses.

**REGENERATED FIBRES: Regenerated Cellulosic Fibres**-Principle of manufacture, Viscose rayon production, Purification of viscose fibre, Physical properties, Chemical properties & Uses.  Modification of viscose rayon. Other regenerated cellulosic fibres – Tencel, Modal and Bamboo.
**Regenerated Protein Fibres**-Principle of manufacture. Casein fibre. Vicara fibre.  Ardil fibre.  General properties.

## SECTION -C

**POLYAMIDE FIBRES:**  Classification of Nylon fibres. General chemical structure of Nylon. General properties of Nylon.  Manufacture of Nylon 6. Uses.  Aromatic polyamides - properties and applications
**POLYESTER FIBRE:** Manufacture of polyester. Chemical structure.   Physical and chemical properties.  Uses.

 **OTHER FIBRES:** Introduction about Polyolefin fibres, Vinyl fibres, Elastomeric fibres, High performance fibres and Inorganic fibres. Unconventional natural fibres.

 **IDENTIFICATION OF FIBRES**:  Feeling Test. Burning test. Microscopic test Staining Test. Chemical test and Density measurement.

**TEXT  BOOKS**

1.  S P Mishra, "A Text Book of Fibre Science and Technology," New Age.  International (P) Ltd., Pub., New      Delhi, 2000.
2.   H V Sreenivasamurthy, "Introduction to Textile Fibres", The Textile Association India, Mumbai, 1998.

**REFERENCE BOOKS**

1.  Bernard P Corbman, "Textiles : Fibre to Fabric," McGraw Hill Book Co., Singapore, 1983. ISBN:0070131376
2.  Marjory L Joseph, "Essentials of Textiles", CBS College Publishing, Newyork, 1984, ISBN:0030627389

# Yarn Manufacture – I (TE-213)

| Course Code | TE-213 | | L=3  T=1   P=0 | |
|---|---|---|---|---|
| Name of the course | **Yarn Manufacture – I** | | | |
| Lectures to be delivered | **52 (1 Hr Each) (L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 100** | | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50% , Tutorials /Assignments 30% ,quiz /Seminar 10% ,Attendance 10%) | **Max Marks :50** | | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Ginning**: Objective of ginning, study of ginning machineries, Pre and post ginning, baling of fibers, latest developments.

**Blow Room:** Objectives, principles of mixing and blending, types of mixing and blending, mixing and blending machineries, blending performance, latest developments in blending machinery.

## SECTION -B

Principles of opening and cleaning and its machinery, classification, study of opening and cleaning machine and its modern developments.  Details of lap forming mechanism, feed regulating motion, calendar roller pressure, length measuring device, lap build, lap defects and its remedies. Chute feed to card. Single line processing. Degree of opening and clearing. Performance assessment of blow room line. Machine and labour productivity. Norms. Calculations pertaining to blow room.

## SECTION -C

**Carding:** Objectives, principles of roller and clearer card, flat card, detail study of flat card and its components. Licker-in, cylinder, doffer and flats. Transfer of fiber. Card clothing. Web stripping and coiler system. Semi high production card. High production card. Neps in carding web. Autoleveller in card. Latest developments. Machine and labour productivity. Norms. Performance assessment and calculations pertaining to carding.

## SECTION -D

**Drawing:** Objectives, principles of drawing and doubling.  Detailed study of draw frame machine. Top and bottom rollers, top roller cots, roller weighting, drafting wave, roller slip and roller eccentricity. Various drafting system, modern drawframe, autoleveller in drawframe, Machine and labour productivity. Norms. Performance assessment and calculation pertaining to draw frame machine.

**TEXT  BOOKS**
1. Klein W, "*Manual of Textile Technology*", Vol. I – III, The Textile Institute, UK (1987)
2. Oxtoby E, "*Spun Yarn Technology*", Butterworth and Co. Ltd. (1987).

**REFERENCE BOOKS**
1. Foster G A K, "*Manual of Cotton Spinning*", Vol. I –IV, The Textile Institute, Manchester (1958).
2. Salhotra K R, "*Spinning of Man Made Fibres and Blends on Cotton Spinning System*", The Textile Association, Mumbai (1989).
3. Khare A R, "*Elements of Blowroom, Carding and Drawframe*", Sai book Centre, Mumbai (1999).

## Fabric Manufacture - I (TE-214)

| Course Code | TE-214 | | L=3 T=1 P=0 | |
|---|---|---|---|---|
| Name of the course | **Fabric Manufacture-I** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks :100** | | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Syllabus**
**Winding:** Objectives, types of packages, types of winding machines, uniform build up of cones, Mechanical and electronic type yarn clearer. Yarn tensioners: Additive, multiplicative, combined and compensating type. Patterning: Reasons and remedies. Yarn fault classifying systems. Basic features of auto winders like Autoconer, Barbar colmman,. Murata etc. Latest developments. Machine and labour productivity. Norms. Performance assessment and calculations.
**TFO:-** Objectives, types, properties of TFO yarn
**Pirn winding:** Objectives, types of pirns, yarn traversing system, different automation and standard winding parameters.

### SECTION -B

**Warping:** Objectives, conditions for warping, comparison of beam warping with sectional warping, basic features of warping machine, different types of creels, reeds, leasing systems. Latest developments. Machine and labour productivity. Norms. Performance assessment and calculations.
**Sizing:** Objectives, classification of sizing methods and sizing machines. Features of sizing machine, machine elements, sizing ingredients, size preparation, control points, principle of different non conventional sizing techniques. Latest developments. Machine and labour productivity. Norms. Performance assessment and calculations.

### SECTION -C

**Drawing in:** Importance, different ways to do it, standard norms. Latest developments.
**Weaving:** History of weaving with manual and automatic loom, and modern loom revolutions. Overall concept about looms and its elements. Different motions of looms: Primary, secondary and auxiliary motions.
**Shedding:** Different types of shedding with advantage and disadvantages, geometry of shedding, importance of bending factor, reed and reed counting systems, tappet shedding and its limitations, positive and negative shedding

.
**Picking:** Types of conventional picking: over picking, under picking and parallel picking. Calculation of shuttle velocity and energy of picking, picking force. Different picking accessories and their functions. Picking timing such as late picking and early picking, reasons of false picking and shuttle fly.

**Sley**: Movement of sley, beat up, sley eccentricity and the factors which influence it, calculation related to sley eccentricity, effects of sley eccentricity on beat up force and timing available for shuttle passage.

**Calculations:** Production, efficiency and balancing of machine, Calculations related to winding, warping and sizing. Numerical based on shedding, picking and sley movement.

## TEXT  BOOKS

1.      *''Winding'',* BTRA Monograph Series, Bombay Textile Research Association, Bombay (1981).
*2*      *'Warping and Sizing'*, BTRA Monograph Series, Bombay Textile Research Association, Bombay (1981).

## REFERENCE BOOKS

1   Mark R, Robinson A T C, "*Principles of Weaving*", The Textile Institute, Manchester (1986).
2.      Talukdar M K, Srirammulu P K and Ajgaokar D B, "*Weaving – Machine, Mechanism and Management*", Mahajan Publisher Private Ltd., Ahmedabad, India (1998).
3.      Booth J E, "*Textile Mathematics*", Part III, Textile Institute, Manchester (1977).

## Textile Machines and Processes Laboratory TE-211 (P)

| Course Code | TE-211 (P) | L=0  T=0   P=2 | |
|---|---|---|---|
| Name of the course | **Textile Machines and Processes Laboratory** | | |
| Lectures to be delivered | **26 Hours of Lab session** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks : 10** |
| Laboratory | Lab work          30%  Lab Record 25% Viva/ Hands on   25% Attendance 20% | **Max Marks: 25** | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

    i)        Performing a practical examination assigned by the examiner.

    ii)       Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of Experiments**

1.      Preparation of lea and hank and calculation of fineness
2.      Calculation of count of yarn using different instruments.
3.      Determination of twist.
4.      To study the objects of different beaters/openers.
5.      To study the working principle of trash analyzer.
6.      To study the working principle and path of the material in a   carding machine.
7.      To study the working principle and path of the material in a drawing frame.
8.      To study the working principle and path of the material in a roving frame.
9.      To study the working principle and path of the material in a spinning frame.
10.    To study the working principle and path of the material in a winding machine.
11.    To study the working principle of conventional weaving machine.
12.    To study the working principle of non-conventional weaving machine.
13.    To study the working principle and yarn path of circular and flat knitting machine.
14.    Study of all the processing machines.
15.    Dyeing of fabric/yarn with direct dyes.
16.    Study of different techniques of printing.
17.    Study of Non-Conventional spinning machine used in Textile industry.

| Course Code | **TE-213 (P)** | **L=0 T=0 P=2** | |
|---|---|---|---|
| Name of the course | **Yarn Manufacture - I Laboratory** | | |
| Lectures to be delivered | **26 Hours of Lab session** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** |
| Laboratory | Lab work        30%  Lab Record 25% Viva/ Hands on   25% Attendance 20% | **Max Marks: 25** | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

    i)         Performing a practical examination assigned by the examiner.

    ii)        Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of experiments**

1. Study of general outline of opener and clearer machine employed in B/R    line process.
2. Study of following in shirley trash analyser machine.
   - Chief organs.
   - Gearing arrangements.
   - Teeth inclination and teeth per inch.
3. Determination of trash content and analysis of waste by using  trash analyser machine.
4. Study of carding machine with technical details.
5. Study of gearing mechanism calculation of the speed of different organs of carding machine.
6. Calculation of draft between different zone and production of carding machine.
7. Study of card settings for different fibre lengths and types.
8. Maintenance and overhauling of carding machine.
9. Study of distribution of fibrous waste in a carding machine.
10. Study of the `NEP -COUNT' in a card.
11. Study of drafting arrangement and top roller weighting system of draw frame machine.
12. Calculation of the total draft and its distribution in draw frame machine.
13. Effects of break draft and roller settings on sliver uniformity.
14. Measurement of nip-load pressure, roller eccentricity and shore hardness of top roller drafting rollers.
15. Maintenance and overhauling of draw frame machine.

## Fabric Manufacture -1 Laboratory TE-214 (P)

| Course Code | TE-214 (P) | | L=0  T=0   P=2 | |
|---|---|---|---|---|
| Name of the course | **Fabric Manufacture-1 Laboratory** | | | |
| Lectures to be delivered | **26 Hours of Lab session** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** | |
| Laboratory | Lab work          30%  Lab Record 25%Viva/  Hands   on          25% Attendance       20% | **Max Marks: 25** | | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

iii)             Performing a practical examination assigned by the examiner.

iv)             Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of Experiments**

1.       Study of the motion transmission system in winding machine.
2.       Study of the effect of slub catcher, yarn tensioner and yarn   guide on package formation.
3.       Study of Package stop motion in cone winding machine.
4.       Calculation of winding speed on grooved drum winding system and study of anti-
          patterning system incorporated to it.
5.       Study of precision winding machine and mechanism of package   building.
6.       Study of the motion transmission system in Pirn winding machine.
7.       Calculation of winding speed and traversing speed of Pirn winding   machine.
8.       Study of  working principle of TFO machine. Calculate the production of TFO.
9.       Study of the sectional working machine and plan the width of   a section according to the
          give  striped fabric keeping in view   the pattern.
10.     To study the passage of yarn on a sizing machine and the features of various parts/
          mechanism of the sizing machine.
11.     To select the proper reed and heald for a weaver's beam keeping in mind the beam, loom
          size and fabric construction.
12.     Study of shedding mechanism of shuttle loom and cam positioning with respect to loom
          cycle.
13.     Study of picking mechanism. Picker movement in relation with crank shaft rotation and
          calculation of average velocity of shuttle.
14.     Study   of sley   movement, construction and calculation of sley eccentricity.

## HUMAN VALUES AND PROFESSIONAL ETHICS-III (HS-203)

| Course Code | HS-203 | L-02, T-0, P-02 | |
|---|---|---|---|
| Name of Course | Human Values and Professional Ethics | | |
| Lectures to be delivered | 52 (L-26, P-26 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continuous Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

**INSTRUCTIONS:**

1. **For Paper Setters:** The question paper will consist of six sections A, B, C, D, E & F. Section F will be compulsory, it will consist of a single question with 10-15 subparts of short answer type, which will cover the entire syllabus. Section A, B, C, D & E will have two questions from the respective sections of the syllabus. Each section will have a weightage of 15% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt six questions in all selecting one question from each of the sections A, B, C, D & E of the question paper and all the subparts of the questions in Section E.

**OBJECTIVES:**
a.      To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations  of all human beings.
b.      To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
c.      To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.
Thus, this course is intended to provide a much needed orientation input in Value Education to the young enquiring minds.

**COURSE METHODOLOGY:**
- The methodology of this course is universally adaptable, involving a systematic and rational study of the human being vis-à-vis the rest of existence.
- It is free from any dogma or value prescriptions.
- It is a process of self-investigation and self-exploration, and not of giving sermons.
- Whatever is found as truth or reality is stated as proposal and the students are facilitated to verify it in their own right based on their Natural Acceptance and Experiential Validation.
- This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and within the student himself/herself finally.
- This self-exploration also enables them to evaluate their pre-conditionings and present beliefs.

# Content

**SECTION A: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels

**SECTION B: Understanding Harmony in the Human Being - Harmony in Myself!**

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - *Sukh* and *Suvidha*
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure *Sanyam* and *Swasthya*

    - Practice Exercises and Case Studies will be taken up in Practice Sessions.

**SECTION C: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship**

13. Understanding harmony in the Family- the basic unit of human interaction
14. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
    Trust (*Vishwas)* and Respect (*Samman*) as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj)*, Universal Order (*Sarvabhaum Vyawastha )*- from family to world family!
    - Practice Exercises and Case Studies will be taken up in Practice Sessions.

**SECTION D: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence**

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence
    - Practice Exercises and Case Studies will be taken up in Practice Sessions.

**SECTION E: Implications of the above Holistic Understanding of Harmony on Professional Ethics**

23. Natural acceptance of human values
24. Definitiveness of Ethical Human Conduct
25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
26. Competence in professional ethics:
a) Ability to utilize the professional competence for augmenting universal human order,
b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems,
c) Ability to identify and develop appropriate technologies and management patterns for above production systems.
27. Case studies of typical holistic technologies, management models and production systems
28. Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b) At the level of society: as mutually enriching institutions and organizations


**TEXT BOOK:**
1. R R Gaur, R Sangal, G P Bhagaria, 2009, *A Foundation Course in Value Education*.

**REFERENCE BOOKS:**
1. Ivan Illich, 1974, *Energy & Equity,* The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
3. A Nagraj, 1998, *Jeevan Vidya ek Parichay,* Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, *How the Other Half Dies,* Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
6. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
7. Subhas Palekar, 2000, *How to practice Natural Farming,* Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth – Club of Rome's report*, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers ,* Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd.
11. Values and Ethics in Business & Professional, Samita Manna & Suparna Chakraborti, PHI Learning Private Limited.

**RELEVANT CDS, MOVIES, DOCUMENTARIES & OTHER LITERATURE:**
1. Value Education website, *http://www.uptu.ac.in*
2. Story of Stuff, *http://www.storyofstuff.com*
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*

# NUMERICAL METHODS FOR ENGINEERS (NS-207)

| Course Code | NS-207 | L-03, T-01, P-0 | |
|---|---|---|---|
| Name of Course | Numerical Methods for Engineers | | |
| Lectures to be delivered | 52 (L-39, P-13 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continuous Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

## INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

### SECTION –A

**SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS:** Bisection method, Method of false position, secant method, Iteration method, Newton-Raphson method and Generalized Newton-Raphson method, Rate of convergence and condition of convergence, solution of simultaneous equations by Iteration method and Newton-Raphson method
**SOLUTION OF SIMULTANEOUS ALGEBRAIC EQUATIONS:** Partial and Complete Pivoting, Gauss Elimination method, Gauss Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation method and LU-decomposition method.

### SECTION-B

**FINITE DIFFERENCE AND INTERPOLATION:** Errors and approximation analysis, Interpolation, Various difference operators and relation between them, Newton's forward and backward interpolation formulae, Central difference Interpolation formula, Gauss's forward and backward interpolation formulae, Stirling formula, Bessel formula, Lagrange's interpolation formula of unequal intervals, Newton's divided difference formulae.

### SECTION-C

**NUMERICAL DIFFERENTIATION AND INTEGRATION:** Numerical differentiation: Derivatives using Newton forward, backward and central difference formulas, Derivatives using Gauss forward and backward formulas, Derivatives using Bessel formula, Derivatives using Newton divided difference formulas, Maxima and minima of tabulated functions.
**NUMERICAL INTEGRATION:** Newton-Cotes Quadrature formula, Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules, Boole's and Weddle's rules, Errors and accuracy of these formulae (Trapezoidal rule, Simpson's $1/3^{rd}$ rule) Romberg's integration.

**NUMERICAL SOLUTIONS OF ORDINARY EQUATIONS:** Picard method, Taylor's series method, Euler's method, Runge's method, Runge-Kutta method, Predictor- Corrector Methods: Milne's method and Adams-Bashforth method.

**NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL:** Finite difference approximations of partial derivatives, solution of Laplace equation (Standard five-point formula and Diagonal five-point formula), Solution of Poisson equation.

**TEXT BOOKS:**
1. Numerical methods for Scientific & Engg. Computations: M. K. Jain, S. R. K. Iyengar & R. K. Jain; Wiley Eastern Ltd.
2. Introductory Methods of Numerical Analysis Engineers & Sciences: S. S. Sastry, PHI Learning Private Limited New Delhi, (2009).

**REFERENCE BOOKS:**
1. Numerical Methods in Engineers & Sciences : J.N Sharma : Narosa Publishers.
2. Numerical Methods in Engg. & Sciences : B.S.Grewal : Khanna Publishers.
3. Computer Oriented Numerical methods: U. Rajaraman Orebtuce; Hall of India.
4. Introduction to Numerical Analysis: C. E. Froberg; Addison Wesley.

# Properties of Fibres TE-221

| Course Code | TE-221 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Properties of Fibres** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**SYLLABUS**

**Fiber structure**: Traditional view of fibre structure. Chemical structure and physical structure. Degree of order and degree of orientation.

**Structure investigation**: Methods of investigation of fibre structure.  Identification of chemical structure by IR spectroscopy. Identification of physical structure by X-ray, SEM, NMR.

## SECTION -B

**Moisture absorption**: Definitions of humidity, moisture regain and moisture content. Relation between regain and relative humidity. Effect of stress and temperature on regain. Heat of sorption. Swelling of fibres. Quantitative theory of  moisture  absorption.

**Fibre friction:**  Technological importance. Measurement of friction. Effect of load and area of contact. Static and kinetic friction.General theory of friction and application to fiber.

## SECTION -C

**Tensile properties**: Factors influencing results of tensile experiment. Expressing results. Different experimental methods. Effect of variability.  Elastic recovery. Effect of test conditions on recovery. Cyclic testing. Fibre  fracture and fatigue.  Time effect. Creep and stress relaxation. Introduction to dynamic testing and fatigue. Concept of models. Kelvin and Maxwell model. Bending and torsional rigidity  of fibre. Structural effect on extension behaviour.

**Dielectric properties:**  Definition and effect of different parameters on dielectric properties.  Electric resistance and effect of different factors on the electrical resistance of fibres.

## SECTION -D

**Static electricity**: Introduction and significance. Measurement of static electricity. Explanation of static phenomena.

**Optical    properties:** Refractive index and birefringence. Birefringence and orientation of fiber. Reflection and lustre.

**Thermal properties**: Structural changes on heating. Thermal transitions. Concept Heat setting of fibres.

## TEXT  BOOKS

1.      Meredith R, "*The Mechanical Properties of Textile Fibres*", North Holland Publishing Co; Amsterdam (1959)
2       Morton W E and Hearle J W S, "*Physical Properties of Textile Fibres*", 1st reprint, The Textile Institute, Manchester (1993)

## REFERENCE BOOKS

1   Gupta V B and Kothari V K, "*Manufactured Fibre Technology*", 1st Ed., Chapman and Hall, London (1997)
2.      Hearle J W S, "*Polymers and their properties*", Vol. I, John Wiley and Sons, NY (1982)
3.      Gedde U W, "*Polymer Physics*", Chapman Hall, London (1995).

# Man Made Fibres (TE-222)

| Course Code | TE-222 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Man Made Fibres** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION –A

**Introduction to man made fibres:** Definition of man made fibres. Brief history of manmade fibres. Relative merits and demerits of manmade fibres and natural fibres.
**SYNTHESIS OF RAW MATERIALS FROM PETROCHEMICALS:** DMT from p-xylene, TPA - Amoco process, MEG - oxidation, acetoxylation process, Caprolactam from phenol, Toluene, Cyclohexane, aniline. Acrylonitrile from acetylene and propylene. Raw materials for rayons.

## SECTION –B

**POLYMER PRODUCTION:** PET through TPA and DMT route, Nylon 66 and Nylon 6 - Acrylic - Polypropylene - Elastomeric - Polyvinyl and Aramid fibres. Physical fundamentals of the fibre spinning process - spinnability of liquids, rheology of spinning, mechanics of spinning, formation of fibre structure .
**MELT SPINNING EQUIPMENTS:** Melting device, Grid and extruder, Static mixer, Pre-filtration, Manifold, Spin pack, Spinneret, Quenching chamber, Spin finish application, Take-up winding. Staple fibre line production details, high speed spinning - Polyester, Polyamide and Polypropylene.

## SECTION –C

**WET AND DRY SPINNING:** Preparation of dope, extrusion and fibre formation. Comparison of wet and dry spinning processes. Dry-jet-wet spinning, Gel spinning. Viscose rayon and variants.
**DRAWING AND HEAT SETTING:** Neck drawing, drawing systems, influence of drawing on structure and properties of fibres. Types of heat setting, influencing parameters on heat setting, influence of heat setting on fibre behaviour.

**MODIFIED SYNTHETIC FIBRES:** Differentially dyeable fibres, Antistatic fibres, Flame retardant fibres, Micro fibres Bicomponent fibres - Cationic dyeable polyester, Polyblend fibres, Tencel .

**QUALITY CONTROL:** Methods for Molecular weight measurements, Thermal characteristic measurements. Testing of filament yarns and staple fibres- denier, tenacity, elongation modulus. - draw force, shrinkage force.

**TEXT BOOKS:**
1.Vaidya A A, "Production of Synthetic fibres", Prentice-Hall of India Pvt. Limited., New Delhi1988.
2. Mclntyre.J.E, " Synthetic Fibres", Univ of leeds, UK, 2000

**REFERENCE BOOKS**
1. Gupta V R and Kothari V K, "Manufactured fibre Technology", Chapman & Hall Pubilication, 1997.
2. Klein W, "Man Made Fibres and their processing",Vol.6, The Textile Institute, 1996
3. Mishra S P, "A Text Book of Fibre Science and Technology", New Age International (P) Limited., Publication., New Delhi, 2000

| Course Code | TE-223 | L=3 T=1 P=0 | |
|---|---|---|---|
| Name of the course | **Yarn Manufacture-II** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION-A

**Combing process**: Objectives, combing for shorter and medium varieties of cotton, cottons suitable for combing, preparation of stock for combing, combing cycle, role of machine components and settings, noil extraction at backward feed and forward feed comber, mathematical problems, norms, performance assessment. Machine and labour productivity. Recent developments.

## SECTION-B

**Process related to roving formation:** Objectives, functions of different machine components and high drafting system, roving twist in speed frame, winding principles and equations related to bobbin leading and flyer leading, building motion, cone profile, numerical problems, norms, performance assessment. Machine and labour productivity. Developments in speed frame.

## SECTION-C

**Ring spinning Process:** Function and mode of operation of ring frame, role of drafting system, yarn guiding devices, forces acting between ring and traveler, yarn tension variation, balloon tension at maximum diameter, tasks of traveller, limiting speed, classification, form of traveler, traveler mass and material, different ring-traveller combinations, fiber lubrication, running on new-ring, winding process, cop building, cylinder and conical tip, spinning geometry, causes of end breaks, numerical problems, norms, performance assessment. Machine and labour productivity. Latest developments including compact spinning.

## SECTION-D

**Non-conventional spinning processes**: Principle of open end spinning, rotor spinning, chief organs and their functions, yarn properties in comparison with ring-spun yarn, principle of friction spinning, function of chief organs, yarn properties and comparison of Dref-II and Dref-III friction spinning machines, basic principle to air jet spun yarn, functions of chief organs, yarn properties, numerical problems, norms, performance assessment. Machine and labour productivity.

**TEXT BOOKS**
1. Klein W, "*Manual of Textile Technology*", The Textile Institute (1995).
2. Khare A R, "*Elements of Combing*", Sai book center, Mumbai (1999).

**REFERENCE BOOKS**
1. Khare A R "*Elements of Ring Frame and Doubling*", Sai book Centre, Mumbai (2000).
2. Salhotra K R, "*Spinning of Man Mades and Blends on Cotton System*", The Textile Association of India, Mumbai (1989).
3. Chattopadhyay R and Rengasamay R, "*Spinning: Drawing, Combing and Roving*", NCUTE-Pilot Programme (1999).

## Fabric Manufacture – II   (TE-224)

| Course Code | TE-224 | | L=3  T=1   P=0 | |
|---|---|---|---|---|
| Name of the course | **Fabric Manufacture - II** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A
**Let-off System**:  Warp and cloth control, different types of let-off systems, control of tension variation.
**Take-up**: Types of take-up and their mechanisms, control of pick density, calculation related to it.

### SECTION -B
**Warp Stop**: Types of warp stop motions and their functioning.
**Weft Stop**: Weft stop mechanisms with advantages and disadvantages.

### SECTION -C

**Weft Replenishment System**: Pirn replenishment mechanism and its limitations.  Different types of feelers used for it.
**Box changing motion**: Working mechanism of multiple box motions (2x1 and 4x1).

### SECTION -D
**Dobby and Jacquard**: Scope of dobby, different types of dobby and their mechanism pegging system as per design of weave, paper dobby. Scope of jacquard, working of different types of jacquards and card punching methods.

**TEXT BOOKS**
1. Mark R and Robinson A T C, "*Principles of Weaving*", The Textile Institute, Manchester (1986).
2. Talukdar M K, Srirammulu P K and Ajgaokar D B, "*Weaving – Machine, Mechanism and Management*", Mahajan Publisher Private Ltd., Ahmedabad, India (1998).

**REFERENCE BOOKS**
1. Aswani K T, "*Fancy Weaving mechanism*", Mahajan Publisher Private Ltd., Ahmedabad, India     (1990)
2. Lunenschloss J and Albrecht W, "*Non-woven Bonded Fabric*", Ellis and Horwood Ltd, U.K. (1985).
3. Lord P R and Mohamad M H, "*Weaving: Conversion of Yarn to Fabric*", Merrow Technical Library, UK (1988).

**Communication & Professional Skills Lab-II (HS-222(P))**

| Course Code | HS-222 (P) | L-0, T-0, P-2 | | |
|---|---|---|---|---|
| Lectures to be Delivered | 26 hours of Lab. work (2 hrs. per week) | | | |
| Semester End Examination | Max Marks: 50 | Min Pass Marks: 20 | Maximum Time: 3 hrs | |
| Continuous Assessment | Lab work          30%   Viva/ Hands on  25% | Lab Record        25%   Attendance        20% | Max Marks: 50 | |

**Instructions for paper setter / candidates:**

Laboratory examination will consist of two parts:

(iii)   Performing a practical exercises assigned by the examiner (25 marks).
(iv)   Viva-voce examination (25 marks)

Note: Each practical should be performed twice for effectiveness.

**List of Practicals:**

1.  Phonetics: Organs of speech, speech sounds, symbols, articulation of speech sounds- stress and intonation.
2.  SWOT analysis (Personal / Organisation)
3.  Group discussion
4.  Debate
5.  Vocabulary improvement programs
6.  Technical write up based on critical thinking (On subject allocated by coordinator)
7.  Telephonic etiquettes: Preparing, Controlling and Follow up.

**RECOMMENDED BOOKS:**

1. Developing Communication Skills: by Krishan Mohan & Meera Bannerji
2. Group Discussions by Sudha Publications And Ramesh Publishing House, New Delhi
3. Vocabulary Improvement: Words Made Easy: by Diana Bonet
4. Word Power Made Easy: by Norman Lewis

## Yarn Manufacture – II Laboratory TE-223 (P)

| Course Code | TE-223 (P) | | L=0  T=0  P=2 |
|---|---|---|---|
| Name of the course | **Yarn Manufacture – II Laboratory** | | |
| Lectures to be delivered | **26 Hours of Lab session** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** |
| Laboratory | Lab work          30%   Lab Record 25%Viva/ Hands on   25% Attendance 20% | **Max Marks: 25** | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

   i)        Performing a practical examination assigned by the examiner.

   ii)       Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**

**List of experiments**

1. To estimate head to head difference in noil level (mill based study).
2. To study the effect of feed per nip on percentage in nep level during combing (mill based study).
3. To study the drafting, twisting and winding zone of speed frame.
4. To study the building motion in speed frame.
5. To study the differential motion of speed frame and calculation of bobbin speed.
6. Calculation of break draft constant, draft constant and twist constant and production of speed frame.
7. To study the influence of machine and process parameters on roving unevenness (mill based study).
8. To study the drafting, twisting and winding zone in ring frame.
9. To study the building motion in ring frame.
10. Calculation of draft constants, twist constant, coils per inch and production of ring frame.
11. To ascertain the effect of break draft and total draft on yarn unevenness and strength (mill based study).
12. Estimation of spinning tension as a function of traveller weight, yarn count and balloon height (mill based study).
13. To perform various settings and maintenance operation on ring frame such as:
    ♦ Ring rail levelling
    ♦ Spindle gauging
    ♦ Spindle eccentricity
    ♦ Lappet eccentricity
14. To study the effect of shore hardness on yarn quality (mill based study).
15. To study the influence of spindle speed and traveller weight on hairiness.
16. Study the chief organs, mechanism and calculations of open end and friction spinning machines.
17. To study the timing diagram of a comber.
18. To study the function of top comb and its depth of penetration with reference to noil extraction and fractionating efficiency (mill based study).
19. To study the nature of movement of nipper assembly.
20. To study the mechanism of detaching roller drive and the nature of its motion.
21. To study the effect of type of feed and detachment setting on noil percentage and fractionating efficiency.

## Fabric Manufacture-II Laboratory TE-224 (P)

| Course Code | TE-224 (P) | | L=0  T=0   P=2 | |
|---|---|---|---|---|
| Name of the course | **Fabric Manufacture –II Laboratory** | | | |
| Lectures to be delivered | **13 Hours for tutorial and 26 Hours of Lab session** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** | |
| Laboratory | Lab work              30%   Lab Record 25% Viva/   Hands   on          25% Attendance         20% | | **Max Marks: 25** | |

Laboratory examination will consist of two parts

i)         Performing a practical examination assigned by the examiner.
ii)        Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of Experiments**

1.      Study of take up motion and calculation of loom take up constant.
2.      Study of positive let-off system.
3.      Study of Warp protection motion (both loose reed and fast reed).
4.      Study of warp stop motion.
5.      Study of Pirn Winding Machine.
6.      Study of temple motions.
7.      Study of pirn changing mechanism.
8.      Study of side/centre weft fork mechanism.
9.      Study of (4x1) and (4X4) multiple box motion.
10.     Identification of fabric faults by fabric inspection machine.
11.     Study of Random / Precision Winding Machine
12.     Dismantling and Assembly of Beat-up Mechanism.
13.     Dismantling and Assembly of Take-up Motion.

## Textile Fibre Laboratory TE-225 (P)

| Course Code | TE-221 (P) | | L=0  T=0   P=2 |
|---|---|---|---|
| Name of the course | **Textile Fibre Laboratory** | | |
| Lectures to be delivered | **26 Hours of Lab session** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** |
| Laboratory | Lab work            30%   Lab Record 25% Viva/ Hands on   25% Attendance 20% | **Max Marks: 25** | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

  i)         Performing a practical examination assigned by the examiner.
  ii)        Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of experiments**

Physical and Chemical identification of following Textile fibre(s)
1.       Identification of cotton
2.       Identification of wool
3.       Identification of silk
4.       Identification of Bast fibres
5.       Identification of polyester
6.       Identification of nylon
7.       Identification of Acrylic
8.       Identification of Polypropylene

Identification of fibres and their ratio in blended textile
1. Analysis of P/C blended fabric
2. Analysis of P/V blended fabric
3. Analysis of P/W blended fabric
4. Estimation of fibre/filament fineness using projection microscope.
5.       Determination of moisture regain and diameter of natural and synthetic fibres under different relative humidity (R.H.).
6. Effects of acids, alkalis and oxidising agents on natural and synthetic fibres.

*PRINCIPLES OF MANAGEMENT AND CRITICAL THINKING (HS-311)*

| Course Code | HS-311 | L - 3, T- 0, P - 2 |
|---|---|---|
| Name of Course | Principles of Management and Critical Thinking | |
| Lectures to be delivered | 65  (L-39, P-26 for each semester) | |
| Semester End Examination | MM: 100 | Min. Marks; 40   Time Allowed: 3 Hrs. |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | MM: 50. |

**INSTRUCTIONS:**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

**Course Objectives:**
* To understand the roles and functions of managers at various (entry, middle and the top) levels
* To explain the relationships between organizational mission, goals, and objectives
* To comprehend the significance and necessity of managing stakeholders
* To conceptualize how internal and external environment shape organizations and their responses
* To demonstrate empirical understanding of various organizational processes and behaviours and the theories associated with them
* To demonstrate critical thinking skills in identifying ethical, global, and diversity issues in planning, organizing, controlling and leading functions of management
* To understand organizational design and structural issues

**Learning Outcomes:** On completion of this course the students should be able to:
* Describe the functions of management.
* Outline the historical theories relating to modern management.
* Explain the role of management within a business setting.
* Describe human resource planning and staffing processes needed to achieve optimal performance
* Prepare a business forecast and budget.
* Illustrate how business ethics and social responsibility apply to organizations.
* Describe formal and informal organizational communication processes and how to influence employees

### SECTION A
Historical Perspectives of Management:          **(6 Hours)**
* The behavioural approach to management
* The management science approach
* The contingency approach

- The system approach

Principles of Planning                                                    **(5 Hours)**
- Defining planning, Purposes of planning,
- Advantages and potential disadvantages of planning,
- Management by objectives, Planning tools,
- Strategic planning, Forecasting and budgeting

## SECTION B

The Management Task                                                       **(4 Hours)**
- The Role of management,
- Defining management,
- The management process, management functions,
- Management goal attainment,
- Management and organizational resources

Fundamentals of Organizing                                               **(5 Hours)**
- The definition of organizing
- The organizing process
- The organizing subsystem
- Classical organizing theory

## SECTION C

Leadership and Effective Communication                                  **(3 Hours)**
- Defining leadership; leader vs. manager,
- Leadership behaviours, Transformational Leadership,
- Coaching, Entrepreneurial leadership

Controlling for Productivity                                             (**4 Hours)**
- Defining production and productivity,
- Quality and productivity, Operations management,
- Operations control, Using control tools to control organizations

## SECTION D

Managerial Ethics and Social Responsibility                             **(6 Hours)**
- Fundamentals of social responsibility,
- Areas of corporate social responsibility,
- Social responsiveness and decision making,
- Influencing individuals performing social responsibility activities,
- A definition of ethics, Creating an ethical workplace

Making Good Business Decision                                            **(6 Hours)**
- Types of decisions, Elements of the decision situation,
- The decision making process, Decision making conditions,
- Decision making tools, Processes for making group decisions

**TEXT BOOKS:**
1. Charles W. L. Hill and Steven McShane (2006) Principles of Management. McGraw-Hill/Irwin; 1st Edition. ISBN-10: 0073530123, ISBN-13: 978-0073530123
2. Moore & Parker, Critical Thinking, 9th ed. (McGraw-Hill, 2008) ISBN-13: 9780073386676

**REFERENCE BOOKS:**
1. Gary Dessler (2003). Management: Principles and Practices for Tomorrow's Leaders, Prentice Hall; 3$^{rd}$ Edition. ISBN-10: 0131009923, ISBN-13: 978-0131009929
2. Ellen A. Benowitz (2001). Principles of Management. Cliffs Notes. ISBN-10: 076456384X, ISBN-13: 978-0764563843
3. Griffin, Ricky W., Management seventh edition, Houghton Mifflin Company
4. Fisher, Alec. The Logic of Real Arguments (Second Edition). Cambridge: Cambridge University Press, 2004.

## PRACTICAL CLASS DISCUSSION TOPICS

Some Basics: Issues, Claims, Arguments- Types & Structures, Clarity- Vagueness, Ambiguity, Credibility, Rhetoric, & Fallacies, Formal Deductive Logic, Deductive Arguments: Truth-Functional Logic

(a) Symbolization; (b) Truth Tables; (c) Long Truth Table Test; (d) Short Truth Table Test;

(e) Deductions w/Inference Rules; (f) Deductions w/Equivalence Rules

Left brain /right brain exercise, Truth and Knowledge, Good and Bad Reasoning, Inductive and Deductive Reasoning, Fallacious Reasoning, Psychological Impediments to Cogent Reasoning

Truth, Belief, and the Leader/Follower Relationship.

| Course Code | TE-311 | | L=3  T= 1   P=0 | |
|---|---|---|---|---|
| Name of the course | **Theory  of Textile Machines** | | | |
| Lectures to be delivered | **52(1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max.Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10% ,Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1.  The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2.  Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Basic concepts**: Kinematics of machine, kinematics link and their different type, types of kinematics pair, kinematics chain, mechanism and inversion of four bar chain and slider crank mechanism.  Degree of freedom. Velocity Analysis: Motion of a link, velocity of a point on a link by relative velocity method, velocities and acceleration of four bar mechanism, slider crank mechanisms, rubbing velocity at a pin  joint. Velocity of a point on a link by instantaneous centre method, properties and types of I-centre, Kennedy theorem and methods of locating I-centres in a mechanism.

**Belt, rope and chain drive**: Types of belt drives, velocity ratio, law of belting, length of belt, ratio of friction tensions, power transmitted, effect of centrifugal tension on power transmission, condition for maximum power transmission, concept of slip and creep.  Use of V belts, ropes, chain, chain length and angular speed ratio, relative advantage and disadvantage of chain and belt drives.

### SECTION -B

**Gears**:  Classification of gears, terminology used in gear, law of gearing velocity of sliding, forms of teeth, construction and properties of an involutes, cycloidal teeth, effect of centre distance variation on the velocity ratio, involutes profile tooth gear, length of path of contact, arc of contact, number of pairs  in contact, interference, minimum number of teeth to avoid the interference between rack and pinion, undercutting, terminology of helical and worm gears.

**Gear trains**: Definition, simple, compound, reverted and epicyclic gear trains, velocity ratio of epicyclic gear trains.

### SECTION -C

**Cams and follower**: Types of cams and followers, cam terminology, types of motion of the follower, analysis of motion of the follower, analysis of motion of the follower for  cams with specified contours.

**Balancing**:  Static and dynamic balancing, balancing of several masses in different planes, balancing of reciprocating masses, balancing machines.

**Flywheels**: Turning moment diagram for steam engine, four stroke internal combustion engines, fluctuation of energy and speed in flywheels, use of flywheel

**Application in Textiles:** Belts, chairs, gear drives in textile machines. Different types of cam followers used in textile machines.

**TEXT BOOKS**
1. Bevan T, "The Theory of Machines", CBS Publishers and Distributors, New Delhi, 2002.
2. Bansal R K, "A text book of Theory of Machines", Laxmi Publication Pvt. Ltd, New Delhi.

   **REFERENCE BOOKS**
   1. Rattan S S, "Theory of Machines", Tata Mc Graw Hill, New Delhi, 2001.
2. Ghosh A and Mallik A K, "Theory of mechanism and machines", Affiliated East West Press Pvt. Ltd, New Delhi, 1988

## Textile Chemical Processing – I (TE-312)

| Course Code | **TE-312** | **L=3  T=1   P=0** | |
|---|---|---|---|
| Name of the course | **Textile Chemical Processing – I** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A
**INTRODUCTION:**  Process line for pretreatment, dyeing, printing and finishing of textiles Chemical processing sequence of Cotton, Silk, Wool, Viscose rayon, Polyester and Polyester / Cotton blend and objectives of the processes. Continuous and batch processes.
**PROCESSING OF KNITTED FABRICS:**    Process sequence of tubular and open width knitted fabrics and objectives of the processes**.**
**Singeing:**  Types of singeing, details of each method, drawbacks and advantages.

### SECTION -B
**Desizing:** Object, types, method details and mechanism of removal of starch. Efficiency of desizing.
**Scouring:** Objectives, mechanism of removal of impurities, recipe and controlling parameters. Scouring of dyed textiles, evaluation of scouring efficiency. Scouring of natural, man made and blended textiles**.**

### SECTION -C
**Bleaching:** Objectives of bleaching. hypochlorite, peroxide, chlorite and per acetic acid bleaching. Field of application. Controlling parameters and mechanism. Efficiency of bleaching.
**Mercerization:** Objectives, mechanism related to various physical and chemical changes in cotton during mercerisation. Process parameters and operation.  Causticization. Barium activity number, its determination and interpretation. Wet and hot mercerisation. Ammonia treatment of cotton. Performance of different mercerisation processes**.**

## SECTION -D

**Heat setting:** Objectives, types, mechanism of setting in each type. Heat setting conditions, controls and efficiency. Heat setting of polyester, nylon, acetate and their blends Concept of colour: Visible spectrum, wavelength and blindness of colour. Metamerism/ isomerism.

**WASHING:** Importance. Washing ranges.  Fabric handling devices**.**

**Drying** : Introduction.  Mechanical drying-mangling, suction drying and centrifuging.  Thermal drying – cylinder drying, stenter drying and radiation drying.

## TEXT BOOKS
1.      Shenai V.A, "*Technology of Bleaching  and Mercerisation*", Sevak Publications, Mumbai (1991)
2.      Peters R. H, "*Textile Chemistry*", Vol - II, Elsevier Publishing Company, London (1967).

## REFERENCE BOOKS

1.   Nunn D M, "*The Dyeing of Synthetic Polymer and Acetate Fibres*", Dyers Company Publication  Trust, London (1979).
2.      Mittal R M and Trivedi S S, "*Chemical Processing of polyester / cellulosic Blends*", Ahmedabad Textile Industries Research Association, Ahmedabad, India (198

<h1 align="center">Textile Testing – I (TE-313)</h1>

| Course Code | TE-313 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | Textile Testing – I | | |
| Lectures to be delivered | 52 (1 Hr Each )(L=39,T=13 for each semester) | | |
| Semester End Examination | Max. Time: 3hrs | Max Marks :100 | Min Marks :40 |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | Max Marks :50 | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

<h2 align="center">SECTION -A</h2>

**Introduction**: Aim and scope of testing, Sample and Population, Sampling techniques for fibre, yarn and fabrics.

**Moisture in Textiles:** Absolute humidity, Relative Humidity, Moisture content, Moisture regain, Factors affecting regain of textile materials, effect of moisture on fibre properties, standard atmospheric conditions, measurement of atmospheric conditions, Shirley moisture meter.

<h2 align="center">SECTION -B</h2>

**Testing of Fibres:** Cotton fibre testing such as length, fineness, maturity, neps, strength, elongation, trash-content, grading of different cotton, fibre contamination measurement, application of HVI and AFIS. Testing of wool and manmade staple fibers, measurement of fiber friction and crimp.

<h2 align="center">SECTION -C</h2>

**Testing of Yarn**: Yarn numbering and conversion system, twist in continuous filament, spun and plied yarns, tensile properties, various type of measuring instruments and their working principles, factors affecting tensile properties, elastic recovery, effect of impact loading and fatigue behavior, yarn friction.

<h2 align="center">SECTION -D</h2>

**Evenness testing of yarns**, nature and causes of irregularities, principles and methods of evenness testing, evaluations and interpretation of evenness results, concept of index of irregularity, variance length curves and spectrogram analysis, yarn faults, classification, utility and principle of different types of measuring instruments. Yarn hairiness, principle of measurement, measuring instruments. Test for filament and textured yarn.

**TEXT BOOKS**

1. Saville B P, "*Physical Testing of Textiles*", Woodhead Publishing Ltd, Cambridge (2002)
2. "Textile Fibers: Developments and Innovations", Ed V K Kothari, IAFL Publications, New Delhi   (2000).

**REFERENCE BOOKS**

1. Booth J E, "*Principles of Textile Testing*", CBS Publishers and Distributors, New Delhi  (1999).
2. Angappan P and Gopalakrishnan R, "*Textile Testing*", SSM Institute of Textile Technology, Komarapalayam (2002).
3. Basu A, "*Textile Testing*", SITRA Coimbatore (2002).

# Non Woven Technology (TE-314)

| Course Code | **TE-314** | | **L=3  T=1  P=0** | |
|---|---|---|---|---|
| Name of the course | **Non Woven Technology** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

**1)    For candidates:** Candidates are required to attempt only five questions in all, out of total 8 questions, of which question no. 8 is compulsory. Use of Non-Programmable Calculators is allowed.

## SECTION -A

**Introduction:** Historical Development, Definitions of nonwovens, Classification of Non-Woven fabrics, Development of nonwoven industry and future perspective.

**Raw materials:** Natural and Synthetic fibres, Bonding agents, Types of bonding agents, Basic structure of bonding agent formulation, Characteristic properties of polymer dispersions, thermosensibility, cross linking, Adhesive fibres, Soluble fibres.

## SECTION -B

**Web formation techniques:** Fibre prepration, Dry laying, wet laying, Parallel laying, Cross laying and random laying methods, Spunlaying, Melt blowing, SM, SMS fabrics.

**Mechanical Bonding:** Needle punching technology, needle punching machine, Felting needles, needle classification and their specifications, Developments in needle punching technology, Factors affecting the properties of needle punched fabrics, Spunlacing technology, factors affecting the spunlaced fabric, Stitch bonding technique.

## SECTION -C

**Chemical Bonding:** Adhesive Bonding, Methods of bonding agent application, Cohesive bonding, Drying by convection, conduction, radiation, infra red drier and high frequency driers.

**Thermal bonding:** Thermal bonding techniques, Area bonding, Point bonding and their properties.

## SECTION -D

**Finishing of nonwoven fabrics:** Shrinkage, Calandering, Pressing, Splitting, Grinding, Washing, Dyeing, Printing, Softening, Coating and Laminating.

**Applications:** Medical and Hygeine, Apparel, Household and Home Textiles, Geotextiles, Filtration, automotive textiles, agriculture, leather industry.

**Testing of Nonwoven fabrics:** Standards and methods of testing nonwoven fabrics

**TEXT BOOKS**
1.      Lunenschloss J and Albrecht W, "*Non-Woven Bonded Fabric*", Ellis and Horwood Ltd., UK   (1985).
2.      Albrecht W, Fuchs H and Kittelmann, "*Nonwoven Fabrics*", Wiley-VCH Weinheim (2003).

**REFERENCE BOOKS**
1.      Mrstina V and Fejgal F, "*Needle punching textile technology*", Elsevier (1990).
2.      Krcma Radco, "*Manual of nonwovens*", Textile Trade Press, UK (1971)
3.      Gulrajani M L, "*Book of Papers of International Conference on Nonwovens*", The TextileInstitute, UK (1992)

## Textile Design and Analysis (TE-315)

| Course Code | TE-315 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Textile Design and Analysis** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50% , Tutorials /Assignments 30%  ,quiz /Seminar 10% ,Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Introduction:** Different types of yarn such as spun, filament, textured and fancy yarns and their impact on textile design. Concept of fabric designing through fabric structure and textile printing. Fabric cover and crimp, importance of fabric structure and analysis, detection of directions of warp and weft, classification of woven fabrics, method of fabric presentation, weaving plans.

**Basic Weaves**: Method of construction, features and uses of plain weave and its derivatives, twill weave and its derivatives, Satin and sateen weaves and their derivatives.

**COLOUR THEORY:** Light, pigment, Lab, HSB – Colour Management : Tint, Tone, Shade, Colour Wheel, Harmonious and contrast, Colours, Colour schemes and themes, 'colour and weave' shade and pattern effects.

### SECTION -B

**Absorbent Fabrics**: Method of preparation, features and uses of Diamond and Diaper Weaves, Honey comb weaves, Huck-a-back and Mockleno weaves.

**Crepe Weave**: Special feature, construction of the weave, method of preparation of its derivatives and uses.

**Bedford Cord weaves**: Method of construction, features, cross-sectional view, derivatives and uses.

### SECTION -C

**Stripe and Check Weaves**:  Features, criteria for selection of weaves for combination, rules governing the joining of different weaves. Method of preparation and uses.

**Colour and Weave Effect**: Weave and colour combinations, features, method of preparation of Continuous line effect, Hounds tooth, Birds eye, Crows foot, Hair lines and Step pattern.

**Terry Weaves**: Definition, classification, process of formation of pile, graphical representation of terry weaves, loop sprouting, extra attachments.

**Backed fabrics**: Definition, features, classification and usage. Graphical representation, warp backed and weft backed cloth, reversible backed fabric, wadded backed fabric.

**Double Cloth**: Definition, features, classification and uses. Method of preparation of self stitched and centre stitched double cloths, their salient feature and uses. Wadded double cloth.

**Calculations**: Raw material calculations to produce different weaves. Technical specification of important fabrics.

**TEXT BOOKS**
1. Groscicki Z J, "*Watsons Textile Design and Colour*", Newnes Buttersworth (1988).
2. Groscicki Z J, "*Watsons Advanced Textile Design*", Newnes Buttersworth (1989).

**REFERENCE BOOKS**

1. Klibbe J W, "*Structural Fabric Design*", Revised edition, 1965, North Carolina State University.
2. Nisbeth H, "*Grammer of Textile Design*", 3rd Ed., D B Tarapore Wala sons and Co. (1994).
3. Gokarneshan N, "*Fabric Structure and Design*", New Age International, New Delhi (2004)

**Textile Chemical Processing – I Laboratory TE-312 (P)**

| Course Code | TE-312 (P) | L=0  T=0   P=2 | |
|---|---|---|---|
| Name of the course | **Textile Chemical Processing - I Laboratory** | | |
| Lectures to be delivered | **26 Hours of Lab session** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** |
| Laboratory | Lab work          30%  Lab Record 25%Viva/  Hands   on          25% Attendance      20% | **Max Marks: 25** | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

i)            Performing a practical examination assigned by the examiner.

ii)           Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of Experiments**

1.       Scouring of cotton goods
2.       Scouring of polyester goods
3.       Scouring of P/C blended goods
4.       Scouring of wool fibre
5.       Scouring of woven cotton fabric using Jigger
6.       Bleaching of cotton with $H_2O_2$
7.       Bleaching of cotton with $NaClO_2$
8.       Bleaching of cotton with NaOCl
9.       Bleaching of Polyester
10.      Bleaching of P/C blend
11.      Bleaching of jute yarns / fabric
12.      .Bleaching of knitted cotton fabric using Winch
13.      Degumming of silk
14.      Analysis of defects in dyeing

## Textile Testing -1 Laboratory TE-313 (P)

| Course Code | TE-313 (P) | | L=0  T=0   P=2 | |
|---|---|---|---|---|
| Name of the course | **Textile Testing - I Laboratory** | | | |
| Lectures to be delivered | **26 Hours of Lab session** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** | |
| Laboratory | Lab work        30%  Lab Record 25% Viva/  Hands  on        25% Attendance        20% | **Max Marks: 25** | | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

i)              Performing a practical examination assigned by the examiner.

ii)             Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**

**List of Experiments**

1.      To prepare a Bear Sorter diagram and determine the following:
♦         Mean Length
♦         Effective length
♦         Short fibres Percentage
♦         Dispersion Percentage
2.      Determine 2.5 % S.L., 50 % S.L., and uniformity ratio of a given cotton using fibrograph. Construct a fibrogram by re-setting the counters for various S.L. between 5 % to 90 %. Compare the fibrogram of manmade fibre with cotton.
3.      Determine the micronaire value of a given  cotton sample by Air-Flow method.  Convert the result into SI units and give a suitable rating to the fibre sample.
4      Determine maturity coefficient and maturity ratio of a given sample by caustic soda method. Give appropriate rating to the fibre sample.
5.      Determine Pressley Index of a cotton sample by  Pressley Tester  at zero and 3mm gauge length   and  convert  result into tenacity. Compare and comment on the results at different gauge lengths.
6.      Determine the bundle strength and elongation of a given manmade fibre using Stelometer. Study the effect of rate  of loading on tensile properties of the fibre.
7.      Study evenness and imperfection in the given yarn and compare     the results with uster statistics.  Study the spectrogram and irregularity trace to determine type of irregularity present. Study the imperfections at different sensitivity level   for different yarn samples.
8.      Prepare  yarns Appearance Boards and compare   with  ASTM standards.
9.      Study the hairiness of a given yarns using Hairiness Tester. Compare the results of Evenness Tester and Hairiness Tester with ASTM grade.
10     Determine coefficient of friction of a spun yarn and see the   effect of waxing on coefficient of friction.
11.     Determine bending rigidity by (HEART) loop method.
12     Determine the Lea C.S.P by Lea CSP Tester and Autosorter and compare the results.
13     Determine the percentage crimp and corrected count with the help of crimp Tester.
14     Determine the crimp rigidity by using hot crimp contraction method.
15     Determine 2.5 % S.L., 50 % S.L.,Strength, fineness, maturity ratio, uniformity ratio etc by using HVI .
16     Determine fineness, trash percentage of fibre by using AFIS

# Textile Design Laboratory TE-315 (P)

| Course Code | TE-315 (P) | L=0 T=0 P=2 | |
|---|---|---|---|
| Name of the course | **Fabric Manufacture - I Laboratory** | | |
| Lectures to be delivered | **26 Hours of Lab session** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** |
| Laboratory | Lab work 30% Lab Record 25%Viva/ Hands on 25% Attendance 20% | **Max Marks: 25** | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

  i)       Performing a practical examination assigned by the examiner.
  ii)      Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

At least 10-12experiments are to be performed by each student

Analysis of different fabric samples to know their particulars as stated:-

*For Yarns:-*

Ends and Picks/inch

Warp and Weft Count and Crimp

Warp and Weft Crimp

Ply and Twist.

*For Fabrics:-*

Tape length, Reed width, Denting order, Weight of warp and Weft and fabrics, Weight per square yard, Warp and weft cover, Colour plan and use.

Study of the following fabrics samples:-

- Plain and derivatives
- Twill and derivatives
- Diamonds and Drapers
- Honey comb
- Huck-a-back
- Mockleno
- Welts and Piques
- Stripe and Cheques
- Satin / Sateen
- Crepe
- Terry pile
- Colour and Weave effect.
- Double Cloth
- Corduroy
- Single Knitted -Single Jersey structure
- Double Knitted-Rib Structure
- Double Knitted -Interlock Structure
- Art work development for Dobby / Jacquard design using computer and realization of production data
- Evaluation of a CAD woven software.

# Semester –VI
## Open Elective
## ENERGY ASSESSMENT AND AUDITING - EE-300

| Course Code | EE-300 | L - 3, T- 0, P – 0 | |
|---|---|---|---|
| Name of Course | Energy Assessment and Auditing | | |
| Lectures to be delivered | 39  (L-39 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

**INSTRUCTIONS:**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

## SECTION A

**Energy Scenario:** Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, re-structuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act- 2001 and its features.

**Basics of Energy and its various forms:** Electricity basics- DC & AC currents, electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

## SECTION B

**Energy Management & Audit:** Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments.

**Material and Energy balance:** Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

## SECTION C

**Energy Action Planning:** Key elements, force field analysis, Energy policy purpose, perspective, contents, formulation, ratification, Organizing - location of energy management, top management support, managerial function, roles and responsibilities of energy manager,

accountability. Motivating-motivation of employees: Information system-designing barriers, strategies; Marketing and communicating-training and planning.

**Financial Management:** Investment-need, appraisal and criteria, financial analysis techniques-simple pay back period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of ESCOs.

## SECTION D

**Project Management:** Definition and scope of project, technical design, financing, contracting, implementation and performance monitoring. Implementation plan for top management, Planning Budget, Procurement Procedures, Construction, Measurement & Verification.

**Energy Monitoring, Targeting and Global environmental concerns:** Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques -energy consumption, production, cumulative sum of differences (CUSUM). United Nations Framework Convention on Climate Change (UNFCC), sustainable development, Kyoto Protocol, Conference of Parties (COP), Clean Development Mechanism (CDM), Prototype Carbon fund (PCF).

**TEXT BOOKS:**
1. L.C. Witte, P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2. O. Callaghn, P.W. "Design and Management for Energy Conservation", Pergamon Press, Oxford.

**REFERENCE BOOKS:**
1. I.G.C. Dryden, "The Efficient Use of Energy" Butterworths, London.
2. W.C. turner, "Energy Management Hand book" Wiley, New York.
3. W.R. Murphy and G. Mc KAY "Energy Management" Butterworths, London.
4. Handbook of Energy Audits by Albert Thuman – Fairman Press Inc.
5. Energy basis for man and nature by Howard T.Odum & Elisbeth. C. Odum.

# TOTAL QUALITY MANAGEMENT - ME-300

| Course Code | ME-300 | L - 3, T- 0, P – 0 | |
|---|---|---|---|
| Name of Course | Total Quality Management | | |
| Lectures to be delivered | 39  (L-39 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

**INSTRUCTIONS:**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

## SECTION A

**Introduction** - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

**Quality Control and Improvement Tools**: Check Sheet, Histogram, Pareto Chart, Cause and Effect diagram, Scatter diagram, Control chart, Graph, Affinity diagram, Tree diagram, Matrix diagram, Process decision program chart, Arrow diagram, Acceptance Sampling, Process capability studies, Zero defect program (POKA-YOKE).

## SECTION B

**TQM PRINCIPLES:** Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal – Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

## SECTION C

**TQM TOOLS & TECHNIQUES:** The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types. Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

## SECTION D

**Quality Management System & Quality Audit:** Quality Systems, Quality management principles, ISO-9000:2000, ISO 9001 : 2000, ISO 14000, Future of quality system audit, Audit objectives, types of quality audit, Quality Auditor, Audit performance. Case studies of TQM implementation in manufacturing and service sectors including IT.

**TEXT BOOKS:**
1. Dale H. Besterfiled, et at., "Total Quality Management", Pearson Education Asia, 3$^{rd}$ Edition, Indian Reprint.
2. Ross, J.E.: Total Quality Management, Vanity Books International.

**REFERENCE BOOKS:**
1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", South-Western (Thomson Learning).
2. Oakland, J.S., "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India)Pvt. Ltd.
4. Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd.
5. Goetsch, D.L. & Davis,S. : Introduction to Total Quality, Prentice Hall.
6. Juran, J.M. & Gryna, F.M. : Quality Planning and Analysis, Tata McGraw Hill Publishing Co. Ltd., New Delhi
7. Charantimath, P.M. : Total Quality Management, Pearson Education.

## OPTIMIZATION METHODS FOR ENGINEERING SYSTEMS - NS-300

| Course Code | NS-300 | L - 3, T- 0, P – 0 | |
|---|---|---|---|
| Name of Course | **Optimization Methods For Engineering Systems** | | |
| Lectures to be delivered | **39  (L-39 for each semester)** | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| **Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %.** | | | MM: 50. |

**INSTRUCTIONS:**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

### SECTION A
**Introduction:** Engineering Application; Statement of the Optimal Problem; Classification; Optimization Techniques;
**Classical Method:** Single Variable Optimization; Multivariable Optimization Without any Constraints with Equality and Inequality Constraints.

### SECTION B
**One-Dimensional Minimization Method:** Unimodal Function; Elimination Method – Dichotomous Search, Fibonocci and Golden Method; Interpolation Method – Quadratic and Cubic Interpolation Method.
**Unconstrained Minimization Method**: Univariate, Conjugate Directions, Gradient And Variable Metric Method.

### SECTION C
**Constrained Minimization Method:** Characteristics of a constrained problem; Direct Method of feasible directions; Indirect Method of interior and exterior penalty functions.
**Geometric Programming:** Formulation and Solutions of Unconstrained and Constrained geometric programming problem.

### SECTION D
**Dynamic Programming**: Concept of Sub-optimization and the principal of optimality: Calculus, Tabular and Computational Method in Dynamic Programming: An Introduction to Continuous Dynamic Programming.
**Integer Programming:** Gomory's Cutting Plane Method for Integer Linear Programming; Formulation & Solution of Integer Polynomial and Non- Linear problems.

**TEXT BOOKS:**
1. Optimization (Theory & Application)- S.S. Rao, Wiley Eastern Ltd, New Delhi.
2. Optimization Concepts and Applications in Engineering – Ashok D.Belegundu and Tirupathi R Chandrupatla – Pearson Education 1999, First India Reprint 2002.

**REFERENCE BOOKS:**
1. Optimization: Theory and Practice, C.S.G. Beveridge and R.S. Schechter, McGraw Hill, New York.
2. Kalyanamoy Deb, "Optimization for Engineering design algorithms and Examples", Prentice Hall of India Pvt. Ltd. 2006.
3. Rao, Singaresu, S., "Engineering Optimization – Theory & Practice", New Age International (P) Limited, New Delhi, 2000.
4. Johnson Ray, C., "Optimum design of mechanical elements", Wiley, John & Sons, 1990.
5. Goldberg, D.E., "Genetic algorithms in search, optimization and machine", Barnen, Addison-Wesley, New York, 1989.

## REMOTE SENSING AND GIS- CE-300

| Course Code | CE-300 | L - 3, T- 0, P – 0 | |
|---|---|---|---|
| Name of Course | Remote Sensing and GIS | | |
| Lectures to be delivered | 39  (L-39 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

**INSTRUCTIONS:**

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

### SECTION A

EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL: Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

PLATFORMS AND SENSORS: Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

### SECTION B

IMAGE INTERPRETATION AND ANALYSIS: Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image Classification – Supervised and unsupervised.

### SECTION C

GEOGRAPHIC INFORMATION SYSTEM: Introduction – Maps – Definitions – Map Projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

### SECTION D

DATA ENTRY, STORAGE AND ANALYSIS: Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data Analysis – Modeling in GIS Highway alignment studies – Land Information System.

**TEXT BOOKS:**
1. Lillesand, T.M., Kiefer, R.W. and J.W. Chipman. (2004). Remote Sensing and Image Interpretation. V Edn. John Willey and Sons (Asia) Pvt. Ltd., New Delhi.
2. Anji Reddy, M. (2001). Textbook of Remote Sensing and Geographical Information System. Second edn. BS Publications, Hyderabad.

**REFERENCE BOOKS:**
1. Lo. C.P. and A.K.W. Yeung (2002). Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Peter A. Burrough, Rachael A. McDonnell (2000), Principles of GIS. Oxford University Press.
3. Ian Heywood (2000), An Introduction to GIS, Pearson Education Asia.

# OPERATING SYSTEMS- CS-300

| Course Code | CS-300 | L - 3, T- 0, P – 0 | |
|---|---|---|---|
| Name of Course | Operating Systems | | |
| Lectures to be delivered | 39  (L-39 for each semester) | | |
| Semester End Examination | MM: 100 | Min. Marks; 40 | Time Allowed: 3 Hrs. |
| Continue Assessment (based on sessional tests 50%) Tutorial/ Assignment: 30%, Quiz/ Seminar: 10 %, Attendance: 10 %. | | | MM: 50. |

INSTRUCTIONS:

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus. Section A, B, C & D will have two questions from the respective sections of the syllabus. Each section will have a weightage of 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E.

## SECTION A

**Introduction to System Software:** Overview of all system software's: Compiler, Assembler, Linker, Loader, Operating system, I/O manager

**Fundamentals of Operating System:** OS services and Components, Multitasking, Multiprogramming, Multiprocessing, Time Sharing, Buffering, Spooling, Distributed OS

## SECTION B

**Process and Thread Management:** Concept of process and threads, Process states, Process management, Context switching, Interaction between processes and OS Multithreading
Example OS : Linux

**Concurrency Control:** Concurrency and Race Conditions, Mutual exclusion requirements, Software and hardware solutions, Semaphores, Monitors, Classical IPC problems and solutions, Deadlock, Characterization, Detection, Recovery, Avoidance and Prevention

## SECTION C

**Memory Management:** Memory partitioning, Swapping, Paging, Segmentation, Virtual, memory, Overlays, Demand paging, Performance of Demand paging, Virtual memory concepts, Page replacement algorithms, Allocation algorithms, Example OS : Linux

**I/O Systems:** Secondary-Storage Structure, Disk structure, Disk scheduling, Disk management, Swap-space management, Disk reliability, Stable storage implementation, Introduction to clock, Clock hardware, Clock software

## SECTION D

**File systems:** File concept, File support, Access methods, Allocation methods, Directory Systems, File protection, Free space management, Example OS : Linux

**Protection & Security:** Protection, Goals of protection, Domain of protection, Access matrix, Implementation of access matrix, Revocation of access rights, Security, The security problem, Authentication, One-Time passwords, Threats, Example OS: Linux **Case Study:** Android OS

**TEXT BOOKS:**
1.  Operating System Concepts by Silberschatz and Galvin, Wiley.
2.  Operating Systems Achyut S. Godbole Tata McGraw Hill

**REFERENCE BOOKS:**
1.  Operating Systems – Internals and Design Principles, by William Stallings, Prentice Hall.
2.  Modern Operating Systems by Andrew S Tanenbaum, Prentice Hall India.
3.  Operating Systems by Gary Nutt, Nabendu Chaki, Sarmishtha Neogy, Pearson
4.  Operating Systems Design & Implementation Andrew S. Tanenbam, Albert S. Woodhull Pearson
5.  Operating Systems D. M. Dhardhere Tata McGraw Hill

| Course Code | TE-321 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Textile Testing – II** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Testing of yarn:** Innovations in yarn testing instruments (dynamic, continuous and on-line testing of yarn quality).

**Testing of Fabric:** Measurement of fabric dimensions and other physical properties such as thickness, weight, crimp, shrinkage, air-permeability, thermal properties, wettability, water proof ness, and flame resistance, Fabric low stress mechanical properties such as smoothness, stiffness, softness and shear, drape behaviour.

## SECTION -B

Test related to fabric appearance such as pilling, crease and wrinkle recovery, light and wash fastness. Fabric handle and factors influencing it, fabric comfort. Serviceability testing parameters such as abrasion resistance, fabric strength, tear strength, bursting strength and snagging test, honey dew, stickiness measurement, assessment of barre and other form of fabric defects.

## SECTION -C

**Testing of Garments:** Tests related to garment appearance and performance such as measurement of seam pucker, seams slippage and seam strength etc.

**Chemical Testing of Textiles:** Identification of fibres, Rubbing Fastness, Laundering fastness.

## SECTION -D

**Statistical Techniques:** Concept of reproducibility and repeatability, methods pertaining to fibre, yarn and fabric testing, concept of quality, quality assurance, textile product leveling, international quality parameters and standards like Uster standards, AITCC, JIS and ASTM.

**TEXT BOOKS**

1. Saville B P, "*Physical Testing of Textiles*", Woodhead Publishing Ltd, Cambridge (2002).
2. Booth J E, "*Principles of Textile Testing*", CBS Publishers and Distributors, New Delhi (1999).

**REFERENCE BOOKS**

1. Angappan P and Gopalakrishnan R, "*Textile Testing*", SSM Institute of Textile Technology, Komarapalayam (2002).
2. Basu A, "*Textile Testing*", SITRA Coimbatore (2002).
3. "*Textile Fibers: Developments and Innovations*", Ed V K Kothari, IAFL Publications, New Delhi (2000).

| Course Code | TE-322 | | L=3 T=1 P=0 | |
|---|---|---|---|---|
| Name of the course | **Theory of Textile Structure** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION-A

**Yarn Geometry**: Basic geometry of twisted yarns. The idealized helical yarn structure, Deviation.

**Real Yarn**: Twist contraction and retraction, Packing of fibres in yarn Forms of Twisting.

## SECTION-B

**Fibre Migration**: Ideal migration, Parameters affecting migration, characterization of migration behaviour, mechanism of migration in single and plied structure.

**Structural Mechanics**: Extension of yarn under small load. Analysis of tensile forces of yarn under stress. Prediction of breakage, Nature of rupture for continuous filament yarn. Extension and breakage of spun yarn: Traditional view and approach by Hearle and E1-Sheikh.

## SECTION-C

**Fabric Geometry**: Engineering approach to the analysis of fabric, Pierce geometrical model relationship between h, p, c, Crimp interchange, Jammed Structure, concept of similar cloth. Minimum possible cover factor. Race track geometry, close limit of weaving concept of pierce elastic thread model, Geometry of plain knitted fabric.

## SECTION-D

**Blended Yarn:** Blended yarn structure, Humburgers Theory. Structure property relationship of ring, rotor, air-jet, friction spun yarn.

**Fabric Properties**: An elementary idea about tensile, bending, shear and drape behaviour of fabric. An elementary idea about fabric objective measurement technology.

**TEXT BOOKS**

1. Hearle J W S, Grosberg P and Backer S, "*Structural Mechanics of Fibres Yarns and Fabrics*", Wiley Interscience, New York (1969).

2. Goswami B C, Martindale J G and Scardino F, "*Textured yarn technology, structure and applications*", Wiley Interscience Publisher, New York (1995).

**REFERENCE BOOKS**

1. Peirce F T and Womersley J R, "*Cloth Geometry*", reprint, The Textile Institute, Manchester (1978).

2. Hearle J W S, Thwaites J J and Amirbayat, *"Mechanics of Flexible Fibre Assemblies"*, Sijthff and Noordhoff International Publishers BV, Alphen aan den Rijn, Netherlands (1980).

3. *"Textile Research Journal"*, Princeton, USA and "*Journal of Textile Institute*", Manchester

## Textile Chemical Processing-II   (TE-323)

| Course Code | TE-323 | | L=3  T=1  P=0 | |
|---|---|---|---|---|
| Name of the course | **Textile Chemical Processing-II** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Theories of colour**: Additive and substractive theories. Primary, secondary, tertiary, complementary and contrasting colours. Tristimulus values. Computer colour matching, kubelka-munk equation, colour-co-ordinates, CIELAB values.
**Theory  of dyeing**:  Dye-fibre interaction, free volume theory.
**Dyeing of Textiles**: Dyeing technology of natural and manmade textiles with direct, reactive, vat, insoluble azoic, sulphur and indigosol, acid, metal-complex, basic and disperse dyes.  Dyeing with Pigments.  Auxiliaries used in dyeing
**Dyeing of blends**: Classification of blends, shades and methods for dyeing of blends. Suitability of each method for dyeing of specific blend.

### SECTION-B

**Pretreatment and dyeing machineries**: Singeing m/c, J-box, kier, mercerizing machine, loose fibre, yarn and package dyeing machines.  Jigger, winch, jet and HTHP beam dyeing m/cs. Padding mangles.
**Carbonisation:** Objectives, selection of chemical,  process details, trouble shoots, precautionary measures and efficiency of carbonisation.
**Printing methods**: Hand block, roller and  screen printing processes. Construction and working of roller printing machine, photoelectric method of screen preparation.  Drawback and advantage of each method.

### SECTION-C

**Printing after treatments**: Importance of steaming, curing, ageing of prints. Mechanism of each process. **Printing Styles**: Direct, discharge and resist styles of printing on natural, man made and blended textiles. **Transfer Printing:** Types, mechanism of transfer in each type and machineries. Transfer printing of natural, man made and blended textiles.
**Mechanical Finishes:** Physical and chemical softening processes, selection of chemical and evaluation of softening. Calendering - its types, construction and function of various calendering m/cs. Sanforizing - method, mechanism and machineries involved. Evaluation of sanforizing.

**Functional finishes** : Problem of creasing, anti-crease finish on cotton. Choice of chemical, catalyst and process parameters. Drawback and advantages associated with use of various anti-crease chemicals. Measures to reduce release of formaldehyde. Water repellency and water repellent finishes on cotton. Evaluation of water repellency.

**DENIM PROCESSING** : Introduction. Indigo dyeing machines – rope form and sheet form. Precautions in Indigo dyeing. Yarn requirements for quality denim fabrics. Denim fabric construction. Finishing and washing of denim fabric. Types of denim fabrics

**TEXT BOOKS**
1. Miles L W C, "*Textile Printing*", Dyers Company Publication Trust, Bradford, England (1981).
2. Shenai V A, "*Technology of Printing*", Sevak Publications, Mumbai (1990).

**REFERENCE BOOKS**
1. Hall A J, "*Textile Finishing*", Haywood Books, London (1996).
2. Shenai V A and Saraf N M, "*Technology of Textile Finishing*", Sevak Publications, Mumbai (1990).
3. Nunn D M, "*The Dyeing of Synthetic Polymer and Acetate Fibres*", Dyers Company Publication Trust, London (1979).

# Garment Technology (TE-324)

| Course Code | TE-324 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Garment Technology** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Garment Manufacturing**: Introduction, Indian apparel industry.  Different garment production systems.
**Selection of Fabrics**: Garment from Woven and knitted fabrics, Various fabrics available in market, their characteristics and applications to suit to different purposes
**Pattern making**: Introduction to pattern making and garment, Construction. Different terminologies. Drafting, Basic bodies blocks, Muslin pattern. Commercial pattern, Methods of making basic pattern, grading of pattern, size, size charts.

## SECTION -B

**Spreading and lay planning**: Introduction to symmetrical and asymmetrical fabrics, criteria of spreading, methods of spreading, spreading m/cs. Principles of lay plan, types of lay plan.
**a)Garment Cutting**: Introduction to cutting room processes, cutting methods and their merit demerits. Bundling system.
**b)Garment Sewing**:  Introduction to sewing m/c and its parts, sewing room processes and working details.  Different types of sewing m/c and its suitability, Different sewing m/c driving system. Attachment of sewing m/c, Sewing needle and its sizes.

## SECTION -C

**Sewing stitches and seams types**: Stitch formation, types of stitches, seam classification, seam geometry seam strength and slippage, seam puckering. Thread calculation and its consumption
**Trimming and Garment accessories**: Definition, types, trimming methodologies and accessories application.
**Garment finishing**: Fasteners, thread tucking, care and size labeling system, checking, pressing, folding and packing, packing standards for domestic and export markets.

**Garment PROCESSSING**: Preparatory processes. Apparel dyeing, printing, washing and finishing processes. Apparel dyeing machines

**Quality Control in Garment manufacturing:** Control in pattern making, grading, fabric laying, marking, sewing and finishing, control of garment defects.

**Computer Application in Garment Manufacturing**: Application in pattern making, grading, lay planning, sewing and finishing, computer aided embroidery designs. Concepts of computer integrated manufacturing (CIM) to the garment industry.

**TEXT BOOKS**
1.      Carr H and Lantham B, "*The Technology of Clothing Manufacture*", Om Book Service,.
2.      Mehta P V  and Bhardwaj  S K,  " *Managing Quality in apparel industry*", Om Book
        Service,

**REFERENCE BOOKS**

   1   Aldrich W, "*Metric Pattern Cutting*", OM Book Service, New Delhi (1998).
   2    Cooklin Gerry, "*Garment Technology for Fashion Designers*", OM Book Service, New
   3   Eveleyn M and Ucas, "*Clothing Construction*", 2$^{nd}$ Ed., Hughton Mifflin Co, Boston (1974)

## Fabric Manufacture –III (TE-325)

| Course Code | TE-325 | | L=3  T=1   P=0 | |
|---|---|---|---|---|
| Name of the course | **Fabric Manufacture –III (TE-5001)** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

### Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Preparation of Yarn  for Shuttle less weaving** : Winding, warping,  sizing and weft preparation.

**Problems of shuttle loom**:  Maximum speed of shuttle loom, design problem of shuttle loom, basic concept of increasing the weft insertion rate in weaving machine.

### SECTION -B

**Projectile Weaving Machine**: Basic principle of projectile loom, sequence of weft insertion, cam drive shedding mechanism, beat-up, torsion bar picking, loom timing, checking of gripper, let-off and take-up motion, selvedge formation.

**Air jet weaving machine**: Problem in air jet weft insertion. Sequence of weft insertion in air jet loom. Design of confuser guide, design of profile reed and relay jet. Loom timing.

**Water-jet Weaving machine**: Weft insertion mechanism, quality of warp required for water jet, selvedge formation, environmental problem, quality of water, problem of water-jet loom.

### SECTION -C

**Rapier Weaving Machine**: Different types of rapier weaving machines, weft insertion sequence in rapier weaving process. Different methods to drive the rapier head.  Single phase double acting rapier. Velocity of the rapier. Loom timing.

**Multi phase Weaving Machine**: Basic concept of multiphase weaving.  shedding operation in  warp way and weft way multiphase loom.  Advantages and disadvantages of multiphase weaving process, circular loom, yarn path and weft incertion in circular loom.

### SECTION -D

**Narrow Fabric Loom**: Different type of narrow fabrics. Mechanism of weft insertion and fabric formation in narrow fabric weaving machine.

**Carpet Weaving**: Woven carpet, design and process of manufacturing wilton and brussel carpets technical specifications and its and uses.

### TEXT BOOKS

1) Marks R and Robinsons A T C, "*Principles of weaving*", Textile Institute, UK   (1986).

2) Lord P R and Mohamad M H, "*Weaving: Conversion of Yarn to Fabric*", Merrow  Technical  Library, UK (1988).

### REFERENCE BOOKS

1) Ormerod A, "*Modern preparations and weaving machinery*", Buttersworth and    co., UK (1983).

2) Talavasek O and Svaty V, "*Shuttleless weaving machine*", Elsevier Scientific Publishing Co., Amsterdam (1981).

3) Lunenschloss J and Albrecht W, "*Non-Woven Bonded Fabric*", Ellis and Horwood Ltd., UK  (1985)

4) N N Banerji," Weaving Mechanism Vol-1&2.

## Textile Testing-II Laboratory TE-321 (P)

| Course Code | TE-321 (P) | L=0  T=0  P=2 | |
|---|---|---|---|
| Name of the course | Textile Testing –II Laboratory | | |
| Lectures to be delivered | 26 Hours of Lab session | | |
| Semester End Examination | Max.Time: 3hrs | Max Marks: 25 | Min Pass Marks :10 |
| Laboratory | Lab work          30%  Lab Record 25% Viva/   Hands   on         25% Attendance        20% | Max Marks:25 | |

**Instructions for paper setter /candidates**

Laboratory examination will consist of two parts:

i)           Performing a practical examination assigned by the examiner.

ii)          Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**

**List of Experiments**

1.       Characterize a woven fabric with respect to its dimensional   properties.

   a.       thread density          e.       cover factor
   b.       yarn number            f.       areal density
   c.       yarn crimp              g.       skewness
   d.       weave                   h.        thickness

2.       Determine  the  tensile  strength and elongation  of a woven  fabric  and  compare the load- elongation  curve  with non-woven  and knitted fabric.

3.       Determine the tear resistance of a fabric using Elmendorf Tear Tester.

4.       Determine the bursting strength of a fabric on a hydraulic bursting tester.

5.       Determine the abrasion resistance   and pilling resistance of    a fabric.

6.       Determine the crease recovery of fabric and observe effect of loading time and recovery time  on crease recovery.

7.       Determine the Drape coefficient of a fabric sample.

8.       Determine the compression property of a fabric (thickness).

9.       Determine   the Air permeability, water permeability and water   repellency of a fabric.

10.      Determine the thermal resistance of a fabric.

11.      Determine the stiffness of a fabric.

12.      Fibre Testing by HVI

13.      Classimat fault analysis (yarn fault classifying system)

14.      Determine moisture content/regain of a fibre sample by hot air oven method.

15.      Determine crimp (crimp %) of a given manmade fibre sample.

16.      Determine fibre fineness of a manmade  fibres/filaments  by:

♦       whole fibre method

♦        vibroscope

17.      Tensile properties of a staple fibre by:

♦       UTM

18.      Determine stress relaxation and creep recovery of fibre

19.      Study of various low stress mechanical properties of fabric by using FAST.

## Textile Chemical Processing-II Laboratory TE-323 (P)

| Course Code | TE-323 (P) | | L=0  T=0   P=2 | |
|---|---|---|---|---|
| Name of the course | **Textile Chemical Processing-II Laboratory** | | | |
| Lectures to be delivered | **26 Hours of Lab session** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | | **Min Pass Marks :10** |
| Laboratory | Lab work          30%  Lab Record 25% Viva/ Hands on   25% Attendance           20% | | **Max Marks: 25** | |

Laboratory examination will consist of two parts
i)          Performing a practical examination assigned by the examiner.
ii)         Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of Experiments**

1.    To dye cotton with Azoic dyes
2.    To dye cotton with Vat dyes
3.    To dye cotton with Indigoid dyes
4.    To dye wool fibre with
▪        Reactive dyes
▪        Acid dyes
▪        Metal complex dyes
5.    To dye silk with acid dyes / acid mordant dyes
6.    To dye polyester with disperse dyes
7.    To dye nylon with acid dyes / metal complex dye
8.    To dye acrylic with basic dyes
9.    To print cotton fabric with hand block method in direct style, discharge style and resist Style
10.   Study of fastness properties of different dyed samples
11.   Identification of dyes on dyed textiles
12.   Dyeing of cotton yarn with hot brand  and cold brand reactive dyes
13.   Dyeing of cotton fabric using natural dyes
14.   Dyeing of Jute with reactive dyes
15.   Determination of Wash and sublimation fastness of dyed fabrics.
16.   Flame retardant finishing and Water proof finishing of cotton fabric using padding mangle
17.   Analysis of textile processing effluents
18.   To finish cotton fabric with
▪        Water repelling agent
▪        Urea – formaldehyde
19.   Study of Jigger, winch, jet and HTHP beam dyeing m/cs. Padding mangles, Garment Dyeing Machine, Fabric Dyeing Machine, Soft Over Flow Dyeing Machine and Infra Color Dyeing Machnine.
20.   Study of Singeing m/c, J-box, kier, mercerizing machine, loose fibre, yarn and package dyeing machines.

## Garment Manufacturing Laboratory TE-324 (P)

| Course Code | TE- 324 (P) | | L=0  T=0   P=2 | |
|---|---|---|---|---|
| Name of the course | **Garment Manufacturing  Laboratory** | | | |
| Lectures to be delivered | **13 Hours for tutorial and 26 Hours of Lab session** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** | |
| Laboratory | Lab work          30%  Lab Record 25% Viva/ Hands on   25% Attendance          20% | **Max Marks: 25** | | |

Laboratory examination will consist of two parts

i)          Performing a practical examination assigned by the examiner.
ii)         Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

Note: At least 10 experiments are to be performed by each student
List of Experiments

1) Study of sewing machine its Types, its construction Parts and functions and use of sewing machines.

2) Study and construction of hand stitches - Basting, Running, Hemming, Back stitch and its Variations
3) Study and construction of seams - Plain, French, Lapped, Flat fell, Hongkong, eased and Top stitched
4) . Study and construction of Gathers, Pleats and Tucks
5) Study and development of patterns for simple designs using basic blocks
6) Study and construction of basic blocks to assemble a garment
7) Garment stitching and finishing
- Darts
- Waist bands
- Pockets
- Placket - slit and seam
- Neckline finish
- Sleeve attachments
8. Study of various types of cutting methods used for cutting a garment.
9. Study of Paper patterns - Types, Contents of paper patterns, uses of paper patterns.
10. Study of various Tools used in Garment construction - Measuring, Marking, embroidery, cutting, pressing, general tools.
11. To get the Knowledge and operation of CAD package for pattern making/digitizing/grading/ marker making
12. To study about Body measurements charts and Direct and standard system of measurement.
13. To study about different woven fabrics, blended fabrics, and knitted fabrics used in garments and their use in garments.
14. Study about different collar types peterpan, cape, mandarin, shirt, scalloped, sailor & rippled collar.
15. Study about Introduction to grading, grading principles, methods of grading, grading machin

**Fashion Designing TE-411(a)**

| Course Code | TE-411(a) | | L=3  T=1   P=0 | |
|---|---|---|---|---|
| Name of the course | **Fashion Designing** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Fashion**: Introduction to fashion and apparel design. Origin of fashion, concept, analysis, trends and creations.

**Fashion Theories**: Fashion of different eras, French and Greek revolutions, fashion promotion, style-fad-trends.

## SECTION -B

**Fashion Design fundamentals**: Basic concept of design, elements of art, Definition of line shape, form, size, space, texture and colour. Structural and decorative dress designing, creating varieties through designs.

**Principles of Design**: Definition Harmony, Proportion, Balance, Rhythm, Emphasis, meaning types and application on apparel psychology of clothing.

## SECTION -C

**Anatomy for designers**: Human Proportion and figure construction.  Methods of determining individual proportions.

**Psychology of Clothes**:  First impression, role of socio- psychological and economical aspects.

## SECTION -D

**Display of fashion materials**: definition and importance, source technique and window display, classic fashion shows.  Important fashion centers of the world and India.

**Computer aided designing**: Fashion sketching, colour matching and computer graphics.

**Folios**:  Creative, Dress, designer.

**TEXT BOOKS**

1.      Erwin Model, "*Clothing for Moderns*", Mac Millan Publications, New York (1994).

2.      Tate and Sharon Lee, "*Inside fashion design*", Harper Publication Inc., UK (1976).

**REFERENCE BOOKS**

1. Mary Kefgen, "*Individuality in Clothing – Selection and Personal Appearance*", Mac Millan Publications, New York (1981).

2. Mikell P, Grover and E Mory, "*Computer Aided Design and Manufacturing*", Prentice Hall  of India Ltd. Delhi (1993).

3.      Bhattacharya Anand, "*Garment Technology*", NCUTE, IIT, Delhi (2003

| Course Code | TE-411(b) | | L=3  T=1  P=0 | |
|---|---|---|---|---|
| Name of the course | **Woollen Technology** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50% Tutorials /Assignments 30% ,quiz /Seminar 10% ,Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Wool fibre and its properties**: Morphological structure, components of fibre, fibre diameter, fibre contour, crimp, length, luster, specific gravity and refractive index, moisture relations, wet ability, fibre mechanical properties, gross composition of raw wool, molecular structures.

## SECTION -B

**Manufacturing wastes**: Noils, soft wastes, hard wastes, finishing wastes, recovered wools, method of recovery, rag picking and garneting. Wool blends with manmade fibres: Purpose of blending, effect of blend composition on performance of fabrics. Woolen or carded Yarns: Preliminary processes, blending or mixing, oiling of the stock, woolen carding, woolen spinning, yarn number and wool grade. Worsted top making and spinning of worsted yarn: Worsted carding, backwashing, oiling, gilling or preparing, worsted combing, tow-to-top conversion systems, worsted drawing, worsted yarn spinning, norms and modern developments.

## SECTION -C

**Manufacture of woolen fabrics**: Woven Fabrics produced by projectile and rapier weaving machines, knitted and nonwoven woolen fabrics, use of FAST in worsted garment manufacturing. Chemical Processing: Objects and different methods of carbonizing of wool batch and continuous methods of scouring fibre, yarn and fabric; peroxide and per-acetic acid bleach of wool; production of anti-shrink wool, basic principle of treatment and parameters; dyeing, printing and finishing, testing and quality control of woollen processing.

## SECTION -D

**Wool Dyeing**: Chemistry of dyeing wool and blend with acid, mordant, metal-complex and reactive dyes, Top and tip dyeing of wool. Wool Finishing: Scooping, damping, decatising and paper pressing of wool, Testing and Quality Control.

**TEXT BOOKS**

1. Blended Textiles, Textile Association (India), 1981.

2. Lepenkov Y, "Wool Spinning", Vol. 1and 2, 1st Ed. Mir Publisher, Moscow, 1983.

**REFERENCE BOOKS**

1 Bergen W V, "Wool Handbook," vol.1 and 2, 3rd Ed., Interscience publisher, London.

2. Teasdale D C, "The Wool Handbook", 4th Ed., 1996.

3. Trotman E R, "Dyeing and Chemical Technology of Textile Fibres", Charles Griffin and Co. Ltd., London, 1975

| Course Code | TE-411(c) | L=3  T=1  P=0 | |
|---|---|---|---|
| Name of the course | **Textile Product and Design** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

<div align="center"><b>SECTION -A</b></div>

Introduction, Characteristics of successful product design, Product development process tools, Understanding customer needs,

<div align="center"><b>SECTION -B</b></div>

Establishing product function and product specification, Concept generation, Concept selection,

<div align="center"><b>SECTION -C</b></div>

Concept testing, Product architecture.  Design for manufacturing, Analytical and Numerical model solutions,

<div align="center"><b>SECTION -D</b></div>

Physical models and experimentation Product design economics.

**Text Books** :-

1. Otto Kevin, & Wood Kristin, Product Design Techniques in Reverse Engineering  and  New product Development Pearson Education publication, Ist Ed, 2006.
2. Ulrich K T, Product Design and Development, TMG, 3rd Ed, 2004

| Course Code | **TE-411(d)** | | **L=3  T=1   P=0** | |
|---|---|---|---|---|
| Name of the course | ADVANCED FABRIC STRUCTURE AND DESIGN | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

**1.** The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

**2.** Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**GAUZE AND LENO :** Basic shed formation - Different types of  Doup healds - Russian Cords - Earing Mechanism - Madras - Muslin structure.

**CREPE FABRICS :** Preparation of yarn for crepe effect - Creping methods. Brocades - Warp rib - Weft rib - Multi weft brocades.

## SECTION -B

**NARROW FABRICS:**  Construction of ribbons and tapes - Zip fastener tapes.

**ARRANGEMENT OF FIGURES :** Unit Repeating Designs - drop design - half drop design - Half drop bases - diamond base - Ogee base - Diagonal waved line base - rectangular base - sateen system of distribution.

## SECTION -C

**TAPESTRY STRUCTURE:** Classification. Axminister carpets - Spool axminister system - Gripper axminister system.

**FIGURED PIQUE FABRICS:** Classification of the structure - loose back piques - half fast back piques.

## SECTION -D

**LAPPET WEAVING:** Lappet wheel construction - Lappet Mechanism - Swivel weaving Mechanism.

**SPECIAL JACQUARDS:**  Self twilling - Sectional - Inverted hook - Border - Compound jacquards. Handloom silk weaving.

**TEXT BOOKS:**
1. Grosziki Z J, "Textile Design and Color", Butterworths,- London, 2004
2. Turner.J.P, "The Production and properties of Narrow Fabrics", Textile Progress, Vol8, No.4, 2004

**REFERENCE BOOKS**
1.  Grosziki Z J, "Advanced Textile Design and Color", Butterworths, London, 2004

**HIGH PERFORMANCE FIBRES TE - 411 (e)**

| Course Code | TE- 411 (e) | L=3  T=1   P=0 | |
|---|---|---|---|
| **Name of the course** | **HIGH PERFORMANCE FIBRES** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**INTRODUCTION:** Growth Patterns - Major attributes and advantages – Product development areas.
**ARAMID:** Fibres formation – Fibre & structure properties and performance – Application. Aromatic polyester**.**

## SECTION -B

**CARBON AND GRAPHITE:** Classification and Types – manufacturing Processes from Polyacrylonitride (PAN) and Rayon structured pitch based fibres- properties**.**

**GLASS FIBRES:** Types and Composition – Manufactures Processes – Fibre structures – Properties – Applications.
**ASBESTOS FIBRES:** Types of manufacturing processes, fibre structure, properties and applications.

## SECTION -C

**CERAMIC FIBRES:** Classification and fibre formation, composition and structure – properties and application**.**
**POLYURETHANE ELASTOMERIC FIBRES:** Manufacturing Processes – Fibre Properties- Application and future trends.
**METALLIC COMPOUND FIBRES:** Aluminium Oxide fibres – Preparation and processes – Fibre structure – properties – Application – composites.Lead Fibres- Preparation of Lead fibre structure and properties of lead fibres – Application – Sound control and Radiation shielding materials

## SECTION -D

**BIO ABSORBABLE FIBRE:** Cotton, Rayon, Modified synthetics- Hollow fibres- Requirements of medical use-Mechanism of absorbency.
**OPTICAL FIBRES:** Light Propagation – Silica Fibres- Fibre manufacture – Application

**TEXT BOOKS:**
1. Menachan Lewis & Jack Preston," High Technology Fibres", Part A,B, C,Merceb Dekkar Inc, 1993.
2. Hearle JWS, "High Performance Fibers", Textile Institute, CRC Press, 2001

**REFERENCE BOOKS**
3. Datsziya, Hongu, Glyno Phillips, "New Fibers" , Woodhead Publishers Ltd, 2001.
4. Mishra S P., "A Text Book of Fibre Science and Technology," New Age  International (P) Ltd., New Delhi, 2000
5. Mukhopadhyay S K, "High Performance fibres", Textile Progress Vol.25, Textile Institute, UK, 1993.

# Process Control in Textiles (TE-412)

| Course Code | TE-412 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Process Control in Textiles** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**System of process control in spinning**:  Role and scope, key variables, establishing norms or standards. Collection and interpretation of data and corrective action.
**Mixing quality and Cost**: Instrumental evaluation of cotton, control of mixing quality through fibre characteristics control of mixing cost and quality, linear programming for cotton mixing and its formulation and approach.
**Yarn realization**: Records and estimation of yarn realization and waste in spinning mill, norms for yarn realization.

## SECTION -B

**Waste and cleaning in Blow room and carding**: Calculation of Trash content and cleaning efficiency, Norms for waste and cleaning efficiency. Assessing the performance of Blow room and card.
**Comber waste control**:  Technological conditions,   optimization of comber waste extraction, norms and procedures for control of comber waste.
**Control of yarn quality**:  Measurement, assessment and control of count, strength, unevenness and imperfections of yarn.

## SECTION -C

**System of process control in weaving**: Scope and approach to process control in weaving. Establishing and standards schedule of checks and machinery audit.
**Quality Control and Productivity in winding warping and sizing**:  Approach, scope, control and optimization.
**Control of productivity in Loom shed**: scope and approach, control of loom speed, efficiency and stops.  Quality of yarn.  Expected loom efficiency, loom allocation.

## SECTION -D

**Fabrics Quality in Weaving**: Scope and approach, control of some specific   fabric defects, grey fabric imperfection.

**System of Process Control in Chemical Processing**:   Scope and approach, norms and Standards

   **Quality control and Productivity**: Quality control and productivity in Bleaching, dyeing, printing and finishing. Control of damages in chemical processing.

## TEXT BOOKS

1.  Garde A R and Subramanian T A, "*Process Control in Cotton Spinning*," ATIRA, Ahmedabad, $2^{nd}$ Ed. (1978).
2.  Paliwal M C and Kimothi P D," *Process Control in weaving*", ATIRA, Ahmedabad $2^{nd}$ Ed (1978).

## REFERENCE BOOKS

1   Gokhale S V and Modi J R, "*Process and Quality Control in Chemical Processing of Textiles*", ATIRA, Ahmedabad (1992)
2   Ratanam T V, "*Quality control in spinning*", SITRA, Coimbatore (1994).
3   Salhotra K R, Chattopadhyay R and Ishtiaque S M, "*Process control in spinning*", IIT, Delhi, CD cell (2001)

## Mechanics of Textile Process TE-413

| Course Code | TE-413 | L=3 T=1 P=0 | |
|---|---|---|---|
| Name of the course | **Mechanics of Textile Process** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Role of Friction in Textile Processes**

**Opening and clearing**: Elementary ideas of tuft opening and dust and foreign matter separation. Analysis of piano feed regulating motion. Evaluation of Blow Room performance.

**Carding**: Mechanics of fibre entanglement and hook formation during carding. Theories of carding. Transfer mechanism of fibres. Cylinder load and transfer efficiency. Fibre configuration and estimation of degree of disorder. Effect of different parameters on hook formation.

### SECTION -B

**Draw frame**: Role of draw frame on yarn quality and process parameters. Hook removal inroller drafting. Drafting Force and its impact on drawing quality

**Combing**: Theoretical aspects of combing. Fractionation in combing. Parameters affecting FEI and combing efficiency and theoretical estimation of FEI

### SECTION -C

**Speed frame**: Mechanism of package building and twisting in speed frame.

**Ring Spinning:** Drives on modern ring frames. Yarn tension in ring spinning. Balloon theory in spinning.

### SECTION -D

**Preparatory to Weaving:** Mechanics of package building during winding, Performance of sensors, Splicing and yarn tension during unwinding, Yarn tension controlling devices, Cone angle and traverse in sectional warping, Stretch control in sizing, Pirn sloughing,

**Weaving**: Kinematics of sley and heald motion, Shed depth and interference factor, Shedding cam design, Mechanism of picking, Shuttle retardation and its importance, Causes of pick variation, Cloth fell equation, Bumping condition.

**TEXT BOOKS**

1. Booth J E, "*Textile Mathematics*", vol. 3 1st ed, The Textile Institute, Manchester (1975).
2. Chattopadhyay R, "*Advances in Technology of Yarn Production*", 1st Ed, NCUTE, IIT Delhi (2002).

**REFERENCE BOOKS**

1 "*Winding*", BTRA Monograph series, The Bombay Textile Research Association, Bombay (1981).
2 "*Warping and Sizing*", BTRA Monograph Series, The Bombay Textile Research Association, Bombay (1981).
3. Marks R and Robinson ATC, "*Principle of Weaving*", The Textile Institute, Manchester (1986).

## Non Conventional Yarn Manufacture TE-414

| Course Code | TE-414 | | L=3  T=1   P=0 | |
|---|---|---|---|---|
| Name of the course | **Non Conventional Yarn Manufacture** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | | **Max Marks :50** | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A
**Introduction**: Fibre characteristics requirements for different leading spinning technologies. Possibilities and limitations of different spinning technologies.

### SECTION -B
**Rotor Spinning**: Principle and raw material preparation. Specifications of different organs and effect of each on the process and product quality.  New developments.
**Air-jet Spinning**: Principle and raw material preparation.  Process and machine parameters affecting product quality. Principle of vortex yarn manufacture. Difference between air jet spun and vortex spun yarn structure.

### SECTION -C
**Friction Spinning**: Principle and raw material preparation, process and machine parameters affecting product quality.  Assessment of DREF-II and DREF-III yarn structures and properties.
**Compact Spinning**: Principle and raw material preparation. Comparative assessment of the structure and performance with respect to ring yarn.

### SECTION -D
**Other Spinning system**:  Self twist, twistless, warp spinning, Electrostatic spinning, Core-spinning, Siro spinning, Bobtex yarn manufacture, solo spun yarn manufacture. New Developments.

**TEXT BOOKS**
1. Salhotra K R and Ishtiaque S M, "*Rotor Spinning : Its advantages, limitations and prospects  In  India*", 1st Ed; National Information Centre for Textile and Allied Subjects (1995).
2. Klein W, "*Manual of Textile Technology: New Spinning Systems*", 1st Ed; The Textile Institute, Manchester, UK (1993).

**REFERENCE BOOKS**
1. Lawrence C A, "*Fundamentals of Spun Yarn Technology*", 1st Ed; CRC Press LLC, Florida,   USA (2003)
2. Chattopadhyay R and Ishtiaque S M, "*Advances in Yarn Manufacturing Process*", Department of Textile Technology, IIT Delhi (1991).
3. Hearle J W S, Hollick L and  Wilson D K, "*Yarn Texturing Technology*", Woodhead Publishing Ltd., UK  (2002).          (1985).

| Course Code | TE-415 | | L=3  T=1   P=0 | |
|---|---|---|---|---|
| Name of the course | **Post Spinning Operations** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2.  Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

**SECTION -A**

**Introduction**: Introduction and objective of post spinning operation. Operations involved in post spinning.

**Drawing**: Introduction of drawing filament/fibre. Theoretical considerations of drawing. Concept of neck drawing. Prediction of neck formation. Significance and stabilization of neck. Drawing unit. Drawing behavior of thermoplastic polymers. Influence of drawing parameters on structure and properties of fibres. High speed spinning and spin draw process. Drawing of pre-oriented yarns and draw-warping.

**SECTION -B**

**Heat-setting**: Introduction and concept of heat-setting. Objective of heat-setting. Different nature of set. Heat-setting behaviour of fibres. Methods of heat-setting. Influence of heat-setting parameters on structure and properties of fibres. Settability and measurement of set.

**Tow conversion**: Introduction of Tow to Top conversion. Different methods for tow to top conversion.

**SECTION -C**

**Bulk yarn**: Introduction of bulk yarn. Objectives of producing bulk yarns. Different methods of producing bulk yarns. Principles of manufacturing acrylic high bulk yarn. Concept and classification textured yarns. Different texturing methods and brief working principles of different texturing methods. Principles of false twist texturing. Material and Machine variables and their influence on the structure and properties of false twist textured yarn.

**SECTION -D**

**Concept of air-jet texturing**. Material and process variables in air-jet texturing and their influence on the structure and properties of air-jet textured yarns. Testing and evaluation of textured yarns. Recent developments in texturing. Air entanglement process.

**TEXT BOOKS**

1.     Gupta V B and Kothari V K, "*Manufactured Fibre Technology*", Chapman and Hall, London   (1999).
2.     Vaidya AA, "*Production of Synthetic Fibres*", 1ⁿᵈ Ed., Prentice Hall of India, NewDelhi (1988).

**REFERENCE BOOKS**

1      Hearle J W S, Hollick L and  Wilson D K, " *Yarn Texturing Technology*", Woodhead Publishing Ltd., UK (2002).
2      Goswami B C, Martindle J G and Scardino F L, "*Textile Yarns Technology, Structure and Applications*", Wiley-Interscience Publication, New York (1976).

# Apparel Marketing and Merchandising TE-416

| Course Code | TE-416 | L=3 T=1 P=0 | | |
|---|---|---|---|---|
| Name of the course | **Apparel Marketing and Merchandising** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**
1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A
**MARKETING:** Marketing Management Demand states and Marketing tasks. Marketing Concepts. Marketing system, Marketing Environment. Marketing organization.
**MARKETING RESEARCH:** Procedure and characteristics of good marketing research.
**FORECASTING AND DEMAND MEASUREMENT**. Measures of Market Demand. Estimating current demand and future demand .

## SECTION -B
**BUYING BEHAVIOR:** Factors influencing buying behavior, Stages of decision buying process. Marketing Strategy: Strategic Planning.  Competitive Marketing Strategies.Market Segmentation: Levels. Patterns. Procedure. Effective segmentation. Market targeting        .
**PRODUCT LIFE CYCLE:** Concept. Marketing strategies for various stages of life cycle        .
**NEW PRODUCT DEVELOPMENT:** Stages of new product development.

## SECTION -C
**PRODUCT AND BRANDING STRATEGY :** Product–line decisions–product–line analysis, product–line length and line modernisation, Featuring and Pruning.  Brand decisions – branding challenges, brand–name decision, brand – building tools, brand strategy decision, brand asset management and brand auditing and repositioning.  Packaging and Labeling.
**PRICING STRATEGIES :** Price setting – steps. Price Adaptation Strategies – Geographical pricing, price discounts and allowances, promotional pricing, discriminatory pricing and produc –mix pricing.

## SECTION -D
**MANAGING RETAILING , WHOLESALING & MARKET LOGISTICS :** Retailing – types, marketing decisions and trends.  Wholesaling – types, marketing decisions and trends.  Market Logistics – objectives and decisions.

**MERCHANDISING:** Introduction. Dimensions of product change. Nature and timing of merchandising responsibilities – line planning, line development, product development and line presentation.

**MATERIALS SOURCING AND SELECTION :** Introduction. Role of sourcing in an apparel industry. Materials sourcing processes. Selection of fabrics. Predicting aesthetics and performance. Evaluation of fabric quality.                                   .

**TEXT BOOKS:**
1.   Philip Kotler, "Marketing Management", Prentice Hall Inc., New Delhi, 2006.
2.   Ruth E.Glock and Grace I.Kunz, "Apparel Manufacturing – Sewn Product Analysis", Prentice
      Hall, New Jersey, 2000, ISBN: 0130846635.

**REFERENCE BOOKS**
1.  Philip Kolter, Kevin Lane Keller, Abraham Koshy and Mithileshwar Jha, "Marketing Management –
     A South Asian Perspective", Pearson Education India, New Delhi, 2006.
2.   Easey M, "Fashion Marketing", Blackwell Sience, Oxford, 2002.
3.   Evelyn C. Moore, "Math for Merchandising", Prentice Hall Inc, NewJersey , 1998

## Fabric Manufacture-III Laboratory TE-417 (P)

| Course Code | TE- 417 (P) | | L=0  T=0  P=2 | |
|---|---|---|---|---|
| Name of the course | **Fabric Manufacture III Laboratory** | | | |
| Lectures to be delivered | **13 Hours for tutorial and 26 Hours of Lab session** | | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** | |
| Laboratory | Lab work          30%  Lab Record 25% Viva/  Hands  on          25% Attendance        20% | **Max Marks:25** | | |

Laboratory examination will consist of two parts

i)         Performing a practical examination assigned by the examiner.

ii)        Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**

**List of Experiments**

  i.   To Study of weft insertion mechanism of projectile weaving machine and advantages of projectile weaving machine.

 ii.   Study of Projectile preparation for picking and weft transmission to the projectile and how the picking mechanism is different from conventional picking mechanism.

iii.   To study about practical problems at initial stages at Air jet loom and loom timing diagram of Tsudakoma Air Jet weaving machine.

 iv.   To study of different rapier head types for different loom and different methods to drive the Rapier head.

  v.   To study comparison between Air jet and water jet weaving machine and also merits and demerits of water jet weaving machine.

 vi.   To study about the mechanism of Water jet picking system and principle involved in the operation of weft supply system

vii.   Study of mechanism of weft insertion and fabric formation in narrow fabric weaving machine.

viii.   To study about the circular multi phase weaving machine, merits and demerits of circular multi phase weaving machine.

 ix.   To study about different types of selvedges used in shuttleless weaving machine with their technical specifications.

  x.   To study about weft accumulator, its types and advantages.

 xi.   To study about  installation/erection of shuttleless weaving machine with machine particulars, technical requirement and economic aspects.

xii.   Study of various methods of adjusting D-box height and position, heald frame height setting and shed amount setting for  different weaves.

xiii.   Preparation of various designs by using Jacquard Punching Machine

**Processing of Man made Fibres and Blended Textile TE-421 (a)**

| Course Code | TE-421 (a) | L=3 T=1 P=0 | | |
|---|---|---|---|---|
| Name of the course | **Processing of Man made Fibres and Blended Textiles** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Introduction:** Structural study of man made and their blends Stability of man made fibres against chemical treatment.
**Classification of blends:** Objectives of blending. Classification, compatibility of components in a blend.

## SECTION -B

**Pretreatment of man mades and blends** : Pretreatment of polyester, nylon, acrylic, acetate fibres and their blends, viz. singeing, desizing, scouring, bleaching, mercerizing and heat setting. Pretreatments machineries.
**Dyeing of blends** : Characterisation of blends, dyeing of primary, binary and ternary blends, viz. A, B, D, A-B, A-D, D-B and A-D-B.
**Dyeing of man mades**: Dye-fibre attachment. Role of fibre structure in dyeing of man mades. Dyeing of polyester in HTHP machines, carrier dyeing, thermosol dyeing. Mechanism of carrier action. Dyeing of nylon with acid, metal complex, disperse, reactive and direct dyes. Dyeing of acrylic with disperse, acid and cationic dyes. Dyeing of differentially dyeable man mades.

## SECTION -C

**Blend dyeing methods**: Single bath single step, single bath two step and two bath two step methods to produce different shades.
**Blend dyeing shades:** Reserve, cross, shadow and solid shades. Possibilities of producing various shades on a specific blend.
**Printing of man mades and blends**: Direct, resist and discharge styles of printing of polyester and its blends. Pigment printing. Carbonised prints. Transfer printing of polyester, nylon, acrylic and their blends.\

**Finishing of man mades and blends**: Mechanical finishing of man mades. Optical whitening, anti-pilling and durable press finishes. Soil release, water repellent and flame retardant finishes on man mades and blends. Anti-static finish.

**Finishing of terry-woolen textiles**: Crabbing, blowing, cropping, anti-felting, pressing and decatising.

**TEXT BOOKS**

1.      Nunn D M, "*The Dyeing of Synthetic Polymer and Acetate Fibres*", Dyers Company Publication Trust, London (1979).
2.      Shore J, "*Colorants and Auxiliaries*", Vol- I and II, Society of Dyers and Colorists, Bradford, England (1990)

**REFERENCE BOOKS**

1      Gulrajani M L, "*Polyester Textiles*", Book of papers: 37th National Textile Conference, The Textile Association (India), Mumbai (1980).
2      Gulrajani M L, "*Blended Textiles*", Book of papers: 38th National Textile Conference, The Textile Association (India), Mumbai (1981).
3.      Datye K V and Vaidye A A, "*Chemical Processing of Synthetic Fibres and Blends*", John Wiley and Sons, New York (1984)

# ECO FRIENDLY TEXTILE PROCESSINGTE-421(b)

| Course Code | **TE-421(b)** | **L=3  T=1   P=0** | |
|---|---|---|---|
| Name of the course | ECO FRIENDLY TEXTILE PROCESSING | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50% ,Tutorials /Assignments 30% ,quiz /Seminar 10% ,Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**INTRODUCTION:** Need for eco-friendly processing. German Regulation and its implications. Azo dyes and the banned amines. Ban of azo dyes in India. Pesticides in fibres / yarns. Heavy metals, Formaldehyde and Pentachlorophenol in textiles.
**ECO STANDARDS AND ECO-LABELS:** Introduction.  M.S.T., OTN100, COMITEXTIL and  Ecomark scheme of India. Criteria for an eco-label based on the life cycle.

## SECTION -B

**ECO-FRIENDLY PROCESSING:** Environmental problems associated  with textile processes. Approach to eco-friendly processing – fibre origin, eco- friendly production, processing and clothing production.
**ECO-MANAGEMENT:** Introduction. Preparation of Ecology Policy Statement. Organization. Systematic review of orders. Purchase policy. Assessment of suppliers. Testing,  Calibration and Checking procedures. Documentation

## SECTION -C

**ECO- AUDIT:** Introduction. Product Audit and Production Audit in Textile Industry. Auditing parameters.
**CERTIFICATION AND LABELLING OF ECO-FRIENDLY TEXTILES:** Introduction. Organizations. Relationship between Eco-labelling and Eco-management & Auditing schemes. Legislation and controls on packaging and packaging waste.

## SECTION -D

**TESTING OF TEXTILES TO ECO-STANDARD SPECIFICATIONS:** Introduction. Test methods for testing the banned chemicals – free formaldehyde, pesticides, pentachlorophenol, heavy metals, azo dyes containing aromatic amines& benzidine and halogenic carriers.

**ECO-TESTING INSTRUMENTS:** Working principles of Gas Chromatography, Mass Spectrometry, High Performance Liquid Chromatography, Atomic Absorption Spectrometry/ Atomic Emission Spectrometry and Plasma Emission Spectroscopy.

**TEXT BOOKS**

1.    Miraftab M and Horrocks A R,  "Eco Textiles", The Textile Institute, Woodhead Publication Limited., Cambridge,  2007.
2.  Susanna Benny and Janakiraman K.P.," Eco parameters: Present Status", Mill Control Report No.15 , The South India Textile Research Association, Coimbatore,1998.

**REFERENCE BOOKS**

1.  The Gazette of India, Extraordinary, Part II section 3, subsection 1 No 157, Ministry of Environment and Forests, Government of India , May 4 ,1996.
2.    The Gazette of India, Extraordinary, Part II section 3, subsection 11 No 193, Ministry of Environment and Forests, Government of India , May 26 ,1997.
3.  Oko-tex Standard 100, International Association for Research and Testing  in the field of Textile Ecology (Oko- tex), Zurich, Switzerland, January, 1997.

# Marketing and Financial Management in Textiles (TE-421 (c)

| Course Code | TE-421 (c) | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Marketing and Financial Management in Textiles** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous assessment (based on sessional tests 50% , Tutorials /Assignments 30% ,quiz /Seminar 10% ,Attendance 10%) | **Max Marks :50** | | |

## Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Marketing Management**: Definitions, Products life cycle, pricing, marketing channels. Promotion Mix.Marketing Research. Basic concepts, research process, market segment, product research, Advertisement Research.

### SECTION -B

Frame work of Retailing in Textiles, career in retailing, Factors affecting retail pricing, Various Textile Industry marketing practices in fibres, yarns, grey fabrics, finished  fabrics.

### SECTION -C

**Elements of Costs**: The cost of material, labor, over head and waste in relation to textile production and finishing. Mill Organization in conjunction with the costing systems: Production Management ;

### SECTION -D

**The costing Department**, operating costs and Process costs Marginal costs and methods to calculate. Different types of costs like opportunity cost, Sunk Cost etc.

## TEXT BOOKS

1. Kotler P, "Marketing Management", Prentice Hall of India, Delhi, 9th Edition, 1998.
2. Dudeja V D, "Management of Textile Industry", Textile Trade Press, Ahmedabad,1981

## REFERENCE BOOKS.
1. Barry Band Joel R.E. "Retail Management" Metmiiam Publishing Co., New York 1989.
2. Ernest H R " Retail Merchandising" Macmillian Publishing Co., New York, 1991.
3. Pandey I M, "Financial Management" Vikas Publishing House, New Delhi, 1999.

# MANUFACTURE OF SPECIALITY TEXTILES  TE-421 (d)

| Course Code | TE-421 (d) | L=3  T=1  P=0 | | |
|---|---|---|---|---|
| Name of the course | **MANUFACTURE OF SPECIALITY TEXTILES** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**NARROW FABRICS:** Introduction –fibre and yarn types, fabrics. Preparation for narrow fabric production-winding, warping, sizing, looming.
**NARROW FABRIC PRODUCTION:** Woven narrow fabrics and their constructions – structure of narrow fabrics woven on shuttleless looms. Conventional shuttle looms, unconventional shuttle looms and shuttleless looms for narrow fabrics production.

## SECTION -B

**SPECIAL FABRICS:** Elasticated fabrics, zip - fastener tapes, curtain - heading tapes, ladder tapes, trimmings, braids, labels, nets, laces, flocked fabrics.
**CARPETS:**  Non-pile carpet weaves and their looms.  Pile surfaced carpet weaves and their looms. Needle felt floor coverings.

## SECTION -C

**INDUSTRIAL TAPES:** Slide fastener tapes - Insulating tapes – Book binder's tapes - Labeling Tapes – Border Tapes – Elastic- Pleated lingerie ribbing.
 **INDUSTRIAL WEBBINGS:** Manufacture of spindle drive webbing – Print webbings – Webbings for automobile safety belts.

## SECTION -D

 **INDUSTRIAL NETS:** Knotted netting – applications.
**INDUSTRIAL BRAIDS:** Classification of braids – Trimmed braids – Flat braids – Circular Braids - Hollow braids. Production techniques. Properties and applications.
**HOME TEXTILES:** Definition – different types of furnishing materials – woven and non woven. Floor coverings – Hard floor coverings – Resilient floor coverings – Soft floor coverings- rugs.  Wall coverings. Home decoration fabrics. Linen fabrics.

**TEXT BOOKS:**

1. Jarmila Svedova ," Industrial Textiles", Elsevier Science Publishing Co in, ISBN – 0444- 98754-1, New york, 1990.
2. Alexander N G," Desighing Interior Environment", Mas court Brace Covanorich Inc,Newyork, 1996.

**REFERENCE BOOKS**

1. Crew, A.H., Arahamsen, H.et al., "Carpets: Back to Front", Textile Progress, Vol.19 No.3, The Textile Institute, Mancheste, 1987.
2. Turner.J.P ., " The production and properties of narrow fabrics", Textile Progress , Vol.8 No.4, The Textile Institute, Manchester,New edition  2002.
3.  Sabit Adanur, "Wellington Sears Handbook of Industrial Textiles", Technomic publishing company Inc., USA, 1995

# Process and Quality Control in Apparel Manufacturing TE-421 (e)

| Course Code | **TE-421 (e)** | | **L=3  T=1   P=0** | |
|---|---|---|---|---|
| Name of the course | **Process and Quality Control in Apparel Manufacturing** | | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | | |
| Semester End Examination | **Max. Time: 3hrs** | | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | | |

## Instructions

1.  The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2.  Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**QUALITY SPECIFICATIONS AND STANDARDS IN RAW MATERIALS:** Purchasing specifications- Testing and Inspection of raw  materials-fabric-fabric inspection system-sewing threads-Zippers-Buttons-Interlining.

**QUALITY CONTROL IN SPREADING ,CUTTING AND BUNDLING PRODUCTS :** Spreading properties. Properties of fabrics- Plaids and naps- Tension in Spreading fabrics- Quality factors in cutting and drill- Bundling and ticketing as related to quality.

### SECTION -B

**STITCH AND SEAM QUALITY MEASUREMENT:** Stitch size- Stitch tension-Seam elasticity and elongation- Fabric distortions - Seam size- Seam slippage and Seam strength Fabric Sewability- Principles for Selecting proper stitch and seam types.

**QUALITY FACTORS IN SEWING** : Control of sewing, seaming and assembly defects-In process inspection in sewing.

### SECTION -C

**QUALITY CONTROL IN PRESSING AND PACKING**: Quality requirement for pressing operation- Quality control in functional package for apparel- Merchandise package- Stock storage Shipping package.

**STATISTICAL SAMPLING:** Acceptable Sampling- Acceptable Quality level (AQL)- Single sampling- Double Sampling.

**CARE LABELLING OF APPAREL:** American Care labelling System-British Care Labelling System- International Care Labelling System- Canadian Care Labelling System- Japanese Care labelling System -Symbols and meanings.

## SECTION -D

**QUALITY CONTROL TOOLS FOR APPAREL MANUFACTURE:** Flowcharts - Control charts- Cause and Effect diagrams-Pareto charts- Check sheets and scatter diagram.

**QUALITY CONTROL OF FINISHED GARMENTS**: Visual inspection and definition of defects and tolerance- Method of measuring.

**QUALITY MANAGEMENT IN GARMENT INDUSTRY:** ISO series of standards-Introduction to TQM-Concepts of TQM Kaizen – Bench marking techniques.

**TEXT BOOKS:**
1    Solinger Jacob,"Apparel Manufacturing Hand book - Analysis , Principles and Practice", Columbia Boblin Media Corp., 1988.
2.   Mehta, Pradip V, "An Introduction to Quality Control for Apparel Industry" ASQC Quality Press., 1992.

**REFERENCES:**
1.   Samuel. K.H. ., "Encyclopedia of Management - TQM Vo1 3, Crest Publishing House 1999.
2.   NMP Nambiar, "A Guide on ISO 9000", Systems and Resources, 1994.

## Mill Management and Maintenance TE-422

| Course Code | TE-422 | L=3  T=1   P=0 | |
|---|---|---|---|
| Name of the course | **Mill Management and Maintenance** | | |
| Lectures to be delivered | **52 (1 Hr Each )(L=39,T=13 for each semester)** | | |
| Semester End Examination | **Max. Time: 3hrs** | **Max Marks :100** | **Min Marks :40** |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | **Max Marks :50** | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

### SECTION -A

**Location and Layout:** Plant location and site selection, Factors affecting location, Plant layout, Different types of layouts, Layout plan for spinning, weaving and process house.

### SECTION -B

**Air conditioning and humidification:** Humidification systems used in Textile Mills, Developments in humidification systems, Heat load, Calculations of total heat, air circulation required.

**Machine Balancing:** Calculation for different machines required for carded and combed yarns, weaving, preparatory and chemical processing.

### SECTION -C

**Costing:** Elements of cost, Cost sheet, Costing the products, conversion cost, cost reduction techniques, impact of end breaks in ring spinning on productivity and cost.

**Power consumption:** Energy consumption in textile machines, Measures to reduce power consumption.

### SECTION -D

**Working environment:** Measures of good working environment, Different types of noise and remedial measures to minimize noise of different departments, terms related to lighting, illumination level required for different departments, lighting plan for different departments, Material handling equipments, Classification of material handling equipments, work load, work assignment, Calculation for work assignment, effect of end breaks on work assignment.

**Maintenance Management:** Maintenance systems, Maintenance cost, Maintenance schedules, Maintenance scheduling, Down time management, Down time analysis, Accidents and safety engineering, Fire prevention and protection.

**TEXT BOOKS**

1. Dudeja V D, "*Management of Textile Industry*", Textile Trade Press, Ahmedabad (1981).
2. Ormerod A, "*Textile Project Management*", The Textile Institute, Manchester UK (1992).

**REFERENCE BOOKS**

1 Talukdar M K, Srirammulu P K and Ajgaokar D B, "*Weaving – Machine, Mechanism and Management*", Mahajan Publisher Private Ltd., Ahmedabad, India (1998).
2 Garde A R and Subramanian T A, "*Process Control in Spinning*", 3rd Ed., ATIRA Ahmedabad, (1987).
3. Higgins, "*Handbook of Maintenance Management*", Prentice Hall New York (1999).

# Knitting Technology (TE-423)

| Course Code | TE-423 | L=3  T=1  P=0 | |
|---|---|---|---|
| Name of the course | Knitting Technology | | |
| Lectures to be delivered | 52 (1 Hr Each )(L=39,T=13 for each semester) | | |
| Semester End Examination | Max. Time: 3hrs | Max Marks :100 | Min Marks :40 |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | Max Marks :50 | | |

**Instructions**

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Knitting**: Process, comparison of weaving and knitting, warp and weft knitting, classification of weft knitting machines.

**Weft Knitting Elements**: Knitting needles, sinkers, cam systems, type of feeding systems, tensioning devices, stop motions.

**Weft Knitted Structures:** Properties and uses of basic weft knitted structures- Plain, Rib, Interlock and Purl alongwith their derivatives.  Different types of stitches.

## SECTION -B

**SPECIALITY STRUCTURES IN WEFT KNITTING:** Fleece, plush, knops, micromesh and striper backing. Yam quality requirements for weft knitting, faults in circular knitting, their causes - avoidance.

**Production**  calculation in weft knitting, calculation of optimum knitting conditions, weft knitted fabricgeometry, dimensional states and dimensional  parameters such as stitch length, WPI, CPI, stitch density, GSM, TF etc.,

## SECTION -C

**Flat Knitting Machines**: Process of loop formation, cam track, features, and structures produced.

**Patterning:** Devices for patterning in circular knitting machine Electronic needle selection.

**Science of Knitting**: Concept of loop length, knitting tension, spirality, production calculations, fabric faults in weft knitting.

**Warp Knitting**: Machines and mechanism. Study of let-off and take up mechanism. Lapping diagrams.

**Production** calculation in warp knitting. Warp Knit fabric geometry: study of dimensional parameters such as stitch length, WP1, CPI, rack, run in, quality, areal density and structural ratio.

**Latest developments**: Knitting machines, other structures in knitting, blanket manufacturing.

**TEXT BOOKS**
1.      Spencer D J, "*Knitting Technology*", 2nd Ed., Pergamon Press (1989)
2.      Ajgaonkar D B, "*Knitting Technology*", Universal Publishing Corporation (1998).

**REFERENCE BOOKS**
1    Booth J E, "*Textile Mathematics*", Vol. 3, Textile Institute, Manchester (1977).
2     Reichman Charles, Lancashire J B and Darlington K D, "*Knitted Fabric Primer*", National Knitted outwear Association, New York (1967).
3    Iyer C, Mammel B and Schach W, "*Circular Knitting*", Meisenbach Bamberg

# Technical Textiles TE-424

| Course Code | TE-424 | L=3  T=1  P=0 | |
|---|---|---|---|
| Name of the course | Technical Textiles | | |
| Lectures to be delivered | 52 (1 Hr Each )(L=39,T=13 for each semester) | | |
| Semester End Examination | Max. Time: 3hrs | Max Marks :100 | Min Marks :40 |
| Continuous Assessment (based on sessional tests 50%, Tutorials /Assignments 30%, quiz /Seminar 10%, Attendance 10%) | Max Marks :50 | | |

## Instructions

1. The question paper will consist of five sections A, B, C, D and E. Section E will be Compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C and D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. Candidates are required to attempt five questions in all selecting one question from each of the section A, B, C and D of the question paper and all the subparts of the questions in section E. Use of non-programmable calculators are allowed.

## SECTION -A

**Introduction**: Definition and scope for technical textiles, brief idea about technical fibres, role of yarn and fabric construction, composite material.

**Filtration textiles**: Definition of filtration parameters, theory of dust collection and solid liquid separation, filtration requirements, concept of pore size and particle size, role of fiber, fabric construction and finishing treatments.

## SECTION -B

**Geotextiles**:  Brief idea about geosynthetics and their uses, essential properties of geotextiles, geotextile testing and evaluation, application examples of geotextiles.

**Medical textiles**:  Classification of medical textiles, description of different medical textiles.

## SECTION -C

**Protective Clothing**:  Brief idea about different type of protective clothing, functional requirement of textiles in defence including ballistic protection materials and parachute cloth, temperature and flame retardant clothing, chemical protective clothing, water proof breathable fabrics.

**Sports and recreation textiles**: Functional requirement of different type of product and their construction

## SECTION -D

**Automotive textiles**: Brief idea about the important properties and requirements in automotive textiles, textiles components in tire, tire structure and design.

**Other uses of technical textile**:  Textiles in agriculture, electronics, power transmission belting, hoses, canvas covers and tarpaulins.

## TEXT BOOKS

1. "*Handbook of Technical Textiles*", Ed. A R Horrocks and S C Anand, Woodhead Publication  Ltd., Cambridge (2000).
2. "*Engineering with Geosynthetics*", Ed. G V Rao and G V S Raju, Tata McGraw Hill Publishing  Co. Ltd., New Delhi (1990).

## REFERENCE BOOKS

1  "*Industrial Textile*", Ed., J Svedova, Elsevier, New York (1990).
2  "*Modern Textile Characterization Methods*", Ed. M Raheel, Marcel Dekker, Inc. (1996).
3   Mukhopadhyay S K and Partridge J F, "*Automotive Textiles*", Vol. 29, No. ½, The Textile Institute (1999).

## Knitting Laboratory TE – 423 (P)

| Course Code | TE-423 (P) | L=0  T=0  P=2 | |
|---|---|---|---|
| Name of the course | **Knitting Laboratory** | | |
| Lectures to be delivered | **13 Hours for tutorial and 26 Hours of Lab session** | | |
| Semester End Examination | **Max.Time: 3hrs** | **Max Marks: 25** | **Min Pass Marks :10** |
| Laboratory | Lab work          30%  Lab Record 25%Viva/ Hands on   25% Attendance         20% | **Max Marks: 25** | |

Laboratory examination will consist of two parts
i) Performing a practical examination assigned by the examiner.
ii) Viva-voce examination.

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

**Note: At least 10 experiments are to be performed by each student**
**List of Experiments**

1. To study the path of yarn through plain knitting machine.
2. To study the different knitting elements including the cam system.
3. To study the driving mechanism of plain knitting m/c.
4. To study the cloth take-up mechanism of plain knitting m/c.
5. To study the rib knitting m/c including arrangement of dial and cylinder needles, cam system and driving mechanism.
6. To study the Interlock knitting m/c including arrangement of dial and cylinder needles, cam system and driving mechanism.
7. To study cam system of V - bed rib knitting m/c.
8. To study driving mechanism of V - bed rib knitting m/c.
9. Preparation of Fabric sample (rib, circular, half cardigan and full cardigan) in V-bed rib knitting machine.
10. To study the effect on loop length with the change in cam setting in flat knitting machine.
11. To study the effect of variation in yarn input tension on the loop length in V-bed rib flat knitting machine.
12. To study plain, rib and Interlock knitted fabrics (course per inch, wales per inch, loop length etc.)
13. Study of Socks and fleece knitting machine

## Project Phase -2  TE-426 (P)

| Course Code | TE- 426(P) | L=0  T=0   P=6 | |
|---|---|---|---|
| Name of the course | **Project-2 TE-426 (P)** | | |
| Lectures to be delivered | | | |
| Semester End Examination | **External** | **Max Marks: 200** | **Min Pass Marks :80** |
| | **Internal** | **Max Marks: 100** | |

**The project involves the following:**

**Preparing a project - brief proposal including**

Problem Identification
A statement of system / process specifications proposed to be developed  (Block Diagram / Concept
      tree)
List of possible solutions including alternatives and constraints
Cost benefit analysis
Time Line of activities

**A report highlighting the design finalization [based on functional requirements & standards  (if
     any) ]**

**A presentation including the following:**

Implementation Phase (Hardware / Software / both)
Testing & Validation of the developed system
Learning in the Project

**Consolidated report preparation**

| Course Code | GP-400 | L=0  T=0  P=0 | | |
|---|---|---|---|---|
| Name of the course | **General Profiency  GP-400** | | | |
| Lectures to be delivered | | | | |
| Semester End Examination | **External** | **Max Marks: 100** | **Min Pass Marks :40** | |

Viva –voce examination will be related to the practical performed /projects executed by the candidate related to the paper during the course of the semester.

Students are expected to collect information related to the following titles from textile industry or other sources under the supervision of a team of Textile department faculty. Every student has to submit a technical report on the information collected and make presentation as per the schedule stipulated by the department. Evaluation will be made on the basis of the technical report and presentation.

1.  Automatic Waste Collection Systems in Spinning Mills.
2.  Productivity Analysis in Spinning and Weaving.
3.  Analysis of fabric defects in Weaving and Knitting.
4.  Techno – Economics of Shuttle and Shuttle less looms
5.  Zero discharge in Textile Processing Industry.
6.  Line balancing in Apparel industry.
7.  Energy conservation in Textile and Apparel Industry.
8.  Costing in Textile and Apparel industry.
9.  Export quality requirements of textiles
10. ERP in Textile Industry.
11. Environmental Standards for Textile and Apparel Industry.
12.SA 8000 standards for Textile and Apparel Industry