सत्यमेव जयते

भारत सरकार
Government of India
वस्त्र मंत्रालय
Ministry of Textiles
विकास आयुक्त (हथकरघा) कार्यालय
Office of the Development Commissioner (Handlooms)

Curriculum, Syllabi, Examination Rules and Regulations

(Regulation - 2021)

भारतीय हथकरघा प्रौघोगिकी संस्थान
INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY
Bargarh / Fulia / Guwahati / Jodhpur / Salem / Varanasi / Champa / Kannur / Gadag / Venkatagiri

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Contents

DHTT Curriculum

INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

Bargarh/Fulia/Guwahati/Jodhpur/Salem/Varanasi/Champa/Kannur/KHTI-Gadag/SPKM-Venkatagiri

DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY

REGULATION 2021 – CURRICULUM

SEMESTER - I								
Sl No	**Category of Course**	**Code No**	**Course Title**	**Hours/week**			**Total credit Hrs/week**	**Credits**
				L	**T**	**P**		
1	Basic Science	BS101	Mathematics - I	2	1	0	3	3
2	Basic Science	BS105	Applied Chemistry	2	1	0	3	3
3	Humanities & Social Science	HS101	Communication Skills in English	2	0	0	2	2
4	Engineering Science	ES101	Engineering Graphics	0	0	3	3	1.5
5	Engineering Science	ES103	Engineering Workshop Practice	0	0	3	3	1.5
6	Basic Science	BS109	Applied Chemistry Lab	0	0	2	2	1
7	Humanities & Social Science	HS103	Sports and Yoga	0	0	2	2	1
8	Humanities & Social Science	HS105	Communication Skills in English Lab	0	0	2	2	1
9	Audit	AU102	Environmental Science	2	0	0	2	0
				Total Credits				**14**
SEMESTER - II								
Sl No	**Category of Course**	**Code No**	**Course Title**	**Hours/week**			**Total credit Hrs/week**	**Credits**
				L	**T**	**P**		
1	Basic Science	BS102	Mathematics - II	3	1	0	4	4
2	Basic Science	BS103	Applied Physics	2	1	0	3	3
3	Engineering Science	ES102	Introduction to IT System	3	0	0	3	3
4	Engineering Science	ES104	Fundamentals of Electrical, Electronics Engineering	2	1	0	3	3
5	Engineering Science	ES106	Engineering Mechanics	2	1	0	3	3
6	Basic Science	BS107	Applied Physics Lab	0	0	2	2	1
7	Engineering Science	ES108	Introduction to IT System Lab	0	0	2	2	1
8	Engineering Science	ES110	Fundamentals of Electrical, Electronics Engineering Lab	0	0	2	2	1
9	Engineering Science	ES112	Engineering Mechanics Lab	0	0	2	2	1
				Total Credits				**20**

SEMESTER - III								
Sl No	**Category of Course**	**Code No**	**Course Title**	**Hours/week**			**Total credit Hrs/week**	**Credits**
				L	**T**	**P**		
1	Programme Core	HTPC201	Textile Fibers	3	0	0	3	3
2	Programme Core	HTPC202	Yarn Manufacturing Technology	3	0	0	3	3
3	Programme Core	HTPC203	Handloom Weaving Technology	3	0	0	3	3
4	Programme Core	HTPC204	Fabric Structure – I	2	1	0	3	3
5	Programme Core	HTPC205	Chemical Processing of Textiles - I	3	0	0	3	3
6	Programme Core	HTPC206	Handloom Weaving Technology Lab	0	0	4	4	2
7	Programme Core	HTPC207	Fabric Analysis & Costing Lab - I	0	0	2	2	1
8	Programme Core	HTPC208	Chemical Processing of Textiles Lab - I	0	0	4	4	2
9	Internship	SI201*	Internship – I	0	0	0	0	2
				Total Credits				**22**

SEMESTER - IV								
Sl No	**Category of Course**	**Code No**	**Course Title**	**Hours/week**			**Total credit Hrs/week**	**Credits**
				L	**T**	**P**		
1	Programme Elective	HTPE2**	Programme Elective - I	3	0	0	3	3
2	Programme Core	HTPC209	Weaving Technology - I	3	0	0	3	3
3	Programme Core	HTPC210	Fabric Structure – II	2	1	0	3	3
4	Programme Core	HTPC211	Chemical Processing of Textiles –II	3	0	0	3	3
5	Programme Core	HTPC212	Textile Testing - I	3	0	0	3	3
6	Programme Core	HTPC213	Colour Concept and Textile Design Lab	0	0	2	2	1
7	Programme Core	HTPC214	Weaving Technology Lab	0	0	4	4	2
8	Programme Core	HTPC215	Chemical Processing of Textiles Lab - II	0	0	4	4	2
9	Programme Core	HTPC216	Textile Testing Lab – I	0	0	3	3	1.5
10	Audit	AU202	Essence of Indian Knowledge and Tradition	2	0	0	2	0
				Total Credits				**21.5**

SEMESTER - V								
Sl No	**Category of Course**	**Code No**	**Course Title**	**Hours/week**			**Total credit Hrs/week**	**Credits**
				L	**T**	**P**		
1	Programme Elective	HTPE3**	Programme Elective - II	3	0	0	3	3
2	Programme Elective	HTPE3**	Programme Elective - III	3	0	0	3	3
3	Programme Core	HTPC301	Weaving Technology - II	3	0	0	3	3
4	Programme Core	HTPC302	Textile Testing - II	3	0	0	3	3
5	Open Elective	##	Open Elective - I	3	0	0	3	3
6	Programme Core	HTPC304	Jacquard Weaving & Computer Aided Textile Designing Lab	0	0	4	4	2
7	Programme Core	HTPC305	Textile Testing Lab - II	0	0	3	3	1.5
8	Projects	PR202	Minor Projects	0	0	4	4	2
9	Internship	SI301**	Internship – II	0	0	0	0	3
10	Audit	AU302	Indian Constitution	2	0	0	2	0
11	Humanities & Social Science	HS302	Seminar	0	0	3	3	1.5
				Total Credits				**25**

SEMESTER - VI								
Sl No	**Category of Course**	**Code No**	**Course Title**	**Hours/week**			**Total credit Hrs/week**	**Credits**
				L	**T**	**P**		
1	Humanities & Social Science	HS303	Entrepreneurship and Start-ups	3	1	0	4	4
2	Programme Elective	HTPE3**	Programme Elective - IV	3	0	0	3	3
3	Open Elective	##	Open Elective - II	3	0	0	3	3
4	Projects	PR302	Major Project	0	0	8	8	4
5	Programme Core	HTPC306	Fabric Analysis & Costing Lab - II	0	0	2	2	1
6	Programme Core	HTPC307	Handicraft Textiles & Handloom Tourism of India	3	0	0	3	3
				Total Credits				**18**

DETAILS OF CREDIT DISTRIBUTION

Category	Credits Allotted	Credit required as per AICTE Norms
Humanities and Social Sciences	9.5	8
Basic Sciences	15	19
Engineering Science	15	15
Programme Core	52	45-50
Programme Elective	12	12-16
Open Elective	6	9-12
Summer Internship - I	2	2
Summer Internship - II	3	3
Minor Project	2	2
Major Project	4	4
Audit Course	0	0
Overall Credit	**120.5**	**119**

LIST OF PROGRAMME ELECTIVES (PE)

Programme Elective-I		**Programme Elective-II**		**Programme Elective -III**		**Programme Elective-IV**	
Code no.	**Course Title**	**Code no.**	**Course Title**	**Code no.**	**Course Title**	**Code no.**	**Course Title**
HTPE201	Textile Costing	HTPE301	Knitting Technology	HTPE304	Technical Textiles	HTPE307	Technological Developments in Handlooms
HTPE202	Garment Manufacturing Technology	HTPE302	Advanced Fabric Structure	HTPE305	Apparel Marketing and Merchandising	HTPE308	Traditional Handloom Textiles of India
HTPE203	Nonwoven Technology	HTPE303	Fashion Designing	HTPE306	Advances in Textile Processing	HTPE309	Home Textiles

LIST OF OPEN ELECTIVES (OE)

Open Elective-I		Open Elective-II	
Code no.	**Course Title**	**Code no.**	**Course Title**
HTOE301	Product Design	HTOE305	Project Management
HTOE302	Introduction to E - Governance	HTOE306	Operations Research
HTOE303	Cyber Security laws, Standards and IPR	HTOE307	Internet of Things
HTOE304	Engineering Economics and Accountancy	HTOE308	Virtual Reality
HTOE309	Energy Conservations and Audit	HTOE311	Disaster Management
HTOE310	Renewable Energy Technologies	HTOE312	Marketing Management and Foreign Trade

***Internship — I (3-4 weeks) 2 Credits**

The internship with course code SI201 pertains to the 3rd semester. This shall be undertaken during the summer vacation at the end of 2nd semester. After completing the internship, the students shall submit the report to the faculty during the 3rd semester for assessment. This internship shall be undertaken in an industry/Govt. or Pvt. Certified Agencies which are in Social sector/ Govt. Skill Centers/Institutes/Schemes.

****Internship — II (4-6 weeks) 3 Credits**

The internship with course code SI301 pertains to the 5th semester. This shall be undertaken during the summer vacation at the end of 4th semester. After completing the internship, the students shall submit the report to the faculty during the 5th semester for assessment. This shall be undertaken in an industry only.

Major Project 4 Credits

PR302 Should be based on real/ live problems of the Industry/Govt./NGO/MSME/Rural sector or an innovative idea having the potential of a Start-up.

DHTT Syllabus

INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

DIPLOMA IN HANDLOOM & TEXTILE TECHNOLOGY

REGULATION 2021

SEMESTER I

BS101 : MATHEMATICS I

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

This course is designed to give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus, permutations, combinations and Basics of Probability and statistics.

Unit 1 TRIGONOMETRY 9

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

Unit 2 DIFFERENTIAL CALCULUS 9

Definition of function; Concept of limits. Four standard limits $\lim_{x \to a}(\frac{x^n - a^n}{x-a})$, $\lim_{x \to 0}(\frac{\sin x}{x})$, $\lim_{x \to a}(\frac{a^x - 1}{x})$,and $\lim_{x \to a}(1+x)^{\frac{1}{x}}$, Differentiation by definition of x^n, $\sin x$, $\cos x$, $\tan x$, e^x and $\log_a x$.Differentiation of sum, product quotient of functions. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

Unit 3 PERMUTATIONS & COMBINATIONS 9

Value of ${}^{n}P_{r}$ and ${}^{n}C_{r}$. Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems.

Unit 4 PROBABILITY & RANDOM VARIABLE 9

Axioms of Probability - Conditional Probability - Total Probability – Baye's theorem - Definition of Random variable – and Types.

Unit 5 STATISTICAL QUALITY CONTROL 9

Concept of samples – types of samples - Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits -

Acceptance sampling.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to

CO1 Appreciate the importance of the geometric study as well as the calculation and the mathematical analysis, by applying trigonometric concepts.

CO2 Find the effects of changing conditions on a system

CO3 Solve simple counting problems using permutations and combination concept

CO4 Apply the concept of probability and random variable in solving real life problems.

CO5 Analyse the quality of samples by applying sampling technique

TEXT BOOK

1 B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40thEdition, 2007.

2 G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9thEdition,1995.

3 Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed.2018)

REFERENCE BOOK

1 Sundaram, R. Balasubramanian, K. A. Lakshminarayanan, Engineering Mathematics, 6/e., Vi-kas Publishing House.

2 Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

3 Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

4 Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014

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BS105: APPLIED CHEMISTRY

L	T	P	C
2	1	0	3

COURSE OBJECTIVES

To understand, ascertain and analyze and properties of natural raw materials require for producing economical and eco-friendly finished products.

1 Solve various engineering problems applying the basic knowledge of atomic structure and chemical bonding.

2 Use relevant water treatment method to solve domestic and industrial problems.

3 Solve the engineering problems using knowledge of engineering materials and properties.

4 Use relevant fuel and lubricants for domestic and industrial applications

5 Solve the engineering problems using concept of Electrochemistry and corrosion.

Unit 1 ATOMIC STRUCTURE, CHEMICAL BONDING & SOLUTIONS 9

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertainty principle, Quantum numbers–orbital concept. Shapes of s,p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration. Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond (H2, F2, HF hybridization in BeCl2, BF3, CH4, NH3, H2O), coordination bond in NH_4^+, and anomalous properties of NH_3, H_2O due to hydrogen bonding, and metallic bonding. Solution – idea of solute, solvent and solution, methods to express the concentration of solution molarity (*M*=mole per liter), ppm, mass percentage, volume percentage and mole fraction.

Unit 2 WATER 9

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness.

Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measurement of water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation.

i). Water softening techniques – soda lime process, zeolite process and ion exchange process.

ii). Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.

Water for human consumption for drinking and cooking purposes from any water sources and enlist Indian standard specification of drinking water (collect data and understand standards).

Unit 3 ENGINEERING MATERIALS 9

Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag, metallurgy – brief account of general principles of metallurgy. Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications. General chemical composition, composition based applications (elementary idea only details omitted): Port land cement and hardening, Glasses Refractory and Composite materials. Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon – 6, nylon-6,6 and Bakelite),

rubber and vulcanization of rubber.

Unit 4 CHEMISTRY OF FUELS AND LUBRICANTS 9

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula. Proximate analysis of coal solid fuel Petrol and diesel - fuel rating (octane and cetane numbers), Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and bio gas.

Lubrication – function and characteristic properties of good lubricant, classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication, physical proper- ties (viscosity and viscosity index, oiliness, flash and fire point, could and pour point only) and chemical properties (coke number, total acid numbers a pontification value) of lubricants.

Unit 5 ELECTROCHEMISTRY 9

Electronic concept of oxidation, reduction and redox reactions.

Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems.

Industrial Application of Electrolysis

- Electrometallurgy
- Electroplating
- Electrolyticre fining.

Application of redox reactions in electrochemical cells –

- Primary cells – dry cell,
- Secondary cell- commercially used lead storage battery, fuel and Solar cells.

Introduction to Corrosion of metals–

- Definition, types of corrosion (chemical and electrochemical), H_2 liberation and O_2 absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.

Internal corrosion preventive measures –

- Purification, alloying and heat treatment and External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Describe the classification and general properties of engineering materials such as metal, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding.

CO2 Assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.

CO3 Qualitatively analyze the engineering materials and appreciate their properties and applications.

CO4 Choose fuel and lubricants suitable for economical industrial processing to obtain eco-friendly finished products.

CO5 a) Ascertain construction, mechanism efficiency of electrochemical cells, solar cell fuel cells

b) Explain corrosion and develop economical prevention techniques.

TEXT BOOK

1 Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.

2 Agarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi,2015.

3 C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd.,2011.

4 Dara,S.S & Dr.S.S.Umare, Engineering Chemistry,S. Chand. Publication, New Delhi, 2015.

5 Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; NewDelhi,2015.

REFERENCE BOOK

1 Dr. Vairam, S.,Engineering Chemistry,Wiley India Pvt. Ltd.,New Delhi,2013.

2 Dr. G. H. Hugar & Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol.II, NITTTR, Chandigarh, Publications,2013,14.

3 Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd.,2014.

4 www.chemguide.co.uk/atommenu.html (Atomic structure and chemical bonding)

5 www.visionlearning.com (Atomic structure and chemical bonding)

6 www.chem1.com (Atomic structure and chemical bonding)

7 https://www.wastewaterelearning.com/elearning/ (Water Treatment)

8 www.capital-refractories.com (Metals, Alloys, Cement, and Refractory Materials)

9 www.em-ea.org/guide%20books/book /2.1%20fuels%20and%20combustion.pdf (Fuel and Combustion)

10 www.chemcollective.org (Metals,Alloys)

11 www.wqa.org(Water Treatment)

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HS101: COMMUNICATION SKILLS IN ENGLISH

	L	T	P	C
COURSE OBJECTIVES	2	0	0	2

Communication skills play an important role in career development. This course aims at introducing basic concepts of communication skills with an emphasis on developing personality of the students. Thus, the main objectives of this course are:

1 To develop confidence in speaking English with correct pronunciation.

2 To develop communication skills of the students i.e. listening, speaking,

reading and writing skills.

3 To introduce the need for personality development- Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc.

Unit 1 COMMUNICATION: THEORY AND PRACTICE 5

- Basics of communication: Introduction, meaning and definition, process of communication etc.
- Types of communication: formal and informal, verbal, non-verbal and written Barriers to effective communication.
- **7** Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).
- Art of Effective communication,
  - Choosing words
  - Voice
  - Modulation
  - Clarity
  - Time
  - Simplification of words
  - Technical Communication.

Unit 2 SOFT SKILLS FOR PROFESSIONAL EXCELLENCE 5

- Introduction: Soft Skills and Hard Skills.
- Importance of soft skills.
- Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligence and empathy etc.
- Applying soft skills across cultures.
- Case Studies.

Unit 3 READING COMPREHENSION 6

Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts:

Section-1

Malgudi Days: R.K. Narayan

The Room on Roof: Ruskin Bond "The Gift of the Magi" by O. Henry

"Uncle Podger Hangs a Picture" Jerome K. Jerome

Section-2

Night of the Scorpion by Nissim Ezekiel,

Stopping by Woods on a Snowy Evening by Robert Frost, Where the Mind is Without Fear by

Rabindranath Tagore, Ode to Tomatoes by Pablo Neruda,

Unit 4 PROFESSIONAL WRITING 7

The art of précis writing, Letters: business and personnel,
Drafting e-mail, notices, minutes of a meeting etc.
Filling- up different forms such as banks and on-line forms for placement etc.

Unit 5 VOCABULARY AND GRAMMAR 7

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.

CO2 Communicate effectively in presentations, interviews and other forms of oral communication

CO3 Draft emails and letters professionally

CO4 Develop non-verbal communication such as proper use of body language and gestures.

TEXT BOOK

1 J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980.

2 Lindley Murray, An English Grammar: Comprehending Principles and Rules. London: Wilson and Sons, 1908.

3 Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Re- vised Edition 2018)

REFERENCE BOOK

1 Margaret M. Maison. Examine your English. Orient Longman: New Delhi, 1964.

2 M. Ashraf Rizvi. Effective Technical Communication. Mc-Graw Hill: Delhi, 2002.

3 John Nielson. Effective Communication Skills. Xlibris, 2008.

4 Oxford Dictionary

5 Roget's Thesaurus of English Words and Phrases

6 Collin's English Dictionary

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ES101: ENGINEERING GRAPHICS

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

1 To understand the language of graphics which is used to express ideas, convey instructions while carrying out engineering jobs.

2 To develop drafting and sketching skills, to know the applications of drawing equipment, and get familiarize with Indian Standards related to engineering drawings.

3 To develop skills to visualize actual object or a part of it, on the basis of drawings.

4 To develop skills to translate ideas into sketches and to draw and read various engineering curves, projections and dimensioning styles.

5 To understand the basic commands and develop basic skills related to computer aided drafting, of how to draw, modify, and edit basic shapes (2D), using AUTOCAD.

S. No.	Practical Exercises	Unit No.	Approx. Hrs
1	Draw horizontal, Vertical, 30 degree, 45 degree, 60 and 75 degrees lines, different types of lines, dimensioning styles using Tee and Set squares/ drafter. (do this exercise in sketch book)	I	02
2	Write alphabets and numerical (Vertical only) (do this exercise in sketch book)	I	02
3	Draw regular geometric constructions and redraw the given figure (do this exercise in sketch book) Part I	II	02
4	Draw regular geometric construction and redraw the given figure (do this exercise in sketch book) Part II	II	02
5	Draw a problem on orthographic projections using first angle method of projection having plain surfaces and slanting. Part I	III	02
6	Draw another problem on orthographic projections using first angle method of projection having slanting surfaces with slots. Part II	III	02
7	Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, Part I	III	02
8	Draw two problems on Isometric view of simple objects having plain and slanting surface by using natural scale. Part I	IV	02
9	Draw some problems on Isometric projection of simple objects having cylindrical surface by using isometric scale. Part I	IV	02

10	Draw free hand sketches/ conventional representation of machine elements in sketch book such as, nuts, bolts, washers. Part I	V	02
11	Problem based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views in sketch book. Part I	III, II, V	02
12	Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD (Print out should be a part of progressive assessment). Part I	V	02
13	Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD (Printout should be a part of progressive assessment). Part II	V	02
14	Draw basic 2D entities like: Circular and rectangular array using AutoCAD (Printout should be a part of progressive assessment). Part III	V	02
15	Draw blocks of 2D entities comprises of Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using AutoCAD (Print out should be a part of progressive assessment). Part IV	V	02
16	Drawbasicbranchspecificcomponentsin2DusingAutoCAD (Printout should be a part of term work). Part I	VI	02
17	Draw complex branch specific components in 2D using AutoCAD (Print should be a part of progressive assessment). Part I	VI	02
	Total		34

Unit 1 BASIC ELEMENTS OF DRAWING 8

Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications.

Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale.

Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning.

Geometrical and Tangency constructions. (Redraw the figure)

Unit 2 ORTHOGRAPHIC PROJECTIONS 8

Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination).

Introduction to orthographic projection, First angle and Third angle method, their symbols.

Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, cylindrical surfaces. (use First Angle Projection method only)

Unit 3 ISOMETRIC PROJECTIONS 8

Introduction to isometric projections. Isometric scale and Natural scale.

Isometric view and isometric projection.

Illustrative problems related to objects containing lines, circles and arcs shape only. Conversion of orthographic views into isometric view/projection.

Unit 4 FREE HAND SKETCHES OF ENGINEERING ELEMENTS 6

Free hand sketches of machine elements: nuts, bolts, washer, (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching) Free hand sketches of orthographic view (on squared graph paper)

Unit 5 COMPUTER AIDED DRAFTING INTERFACE 7

Computer Aided Drafting: concept.

Hardware and various CAD software available.

System requirements and Understanding the interface.

Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon.

File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit.

Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action

Unit 6 COMPUTER AIDED DRAFTING 8

Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Poly Line.

Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates.

Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers.

Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous,

Diameter, Radius, Angular Dimensions.

Dim scale variable. Editing dimensions.
Text: Single line Text, Multiline text.

Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Select and construct appropriate drawing scales, use drawing Equipment's with Indian Standards of engineering drawing.

CO2 Draw views of given object and components.

CO3 Sketch orthographic projections into isometric projections and vice versa.

CO4 Apply computer aided drafting tools to create 2D engineering drawings.

TEXT BOOK

1 Bureau of Indian Standards. Engineering Drawing Practice for Schools and Colleges IS: Sp-46. BIS. Government of India

2 Bhatt, N. D. Engineering Drawing. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93- 80358-17-8

3 Jain & Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978- 93-86173-478)

4 Jolhe, D. A. Engineering Drawing. Tata McGraw Hill Edu. New Delhi, 2010; ISBN: 978-0-07- 064837-

5 Dhawan, R. K. Engineering Drawing. S. Chand and Company, New Delhi; ISBN: 81-219-1431-0

6 Shah, P. J. Engineering Drawing. S. Chand and Company, New Delhi, 2008, ISBN:81-219-2964-4.

7 Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. Engineering Graphics with AutoCAD. PHI Learning Pri- vate Limited-New Delhi (2010); ISBN: 978-8120337831.

Jeyapoovan, T. Essentials of Engineering Drawing and Graphics using AutoCAD. Vikas Publishing HousePvt. Ltd, Noida, 2011; ISBN: 978-8125953005.

8 Autodesk. AutoCAD User Guide. Autodesk Press, USA, 2015.

9 Sham, Tickoo. AutoCAD 2016 for Engineers and Designers. Dreamtech Press; Galgotia Publication, New Delhi, 2015; ISBN 978-9351199113.

REFERENCE BOOK

1 https://www.youtube.com/watch?v=TJ4jGyD-WCw

2 https://www.youtube.com/watch?v=dmt6_n7Sgcg

3 https://www.youtube.com/watch?v=_MQScnLXL0M

4 https://www.youtube.com/watch?v=3WXPanCq9LI

5 https://www.youtube.com/watch?v=fvjk7PlxAuo

6 http://www.me.umn.edu/coursesme2011/handouts/engg%20graphics.pdf

7 https://www.machinedesignonline.com

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ES103 : ENGINEERING WORKSHOP PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

1 To understand basic engineering processes for manufacturing and assembly.
2 To understand, identify, select and use various marking, measuring, and holding, striking and cutting tools and equipment's.
3 To understand and interpret job drawings, produce jobs, and inspect the job for specified dimensions.
4 To understand the various types of wiring systems and acquire skills in house wiring.
5 To understand, operate, control different machines and equipment's adopting safety practices.

Unit 1 CARPENTRY 8

i) Demonstration of different wood working tools/machines.
ii) Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc.
iii) One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.

Unit 2 FITTING 9

i) Demonstration of different fitting tools and drilling machines and power tools
ii) Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc.
iii) One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc.

Unit 3 WELDING 8

i) Demonstration of different welding tools / machines.
ii) Demonstration on Arc Welding, Gas Welding, of broken parts with welding.
iii) One simple job involving butt and lap joint.

Unit 4 SHEET METAL WORKING 8

i) Demonstration of different sheet metal tools / machines.
ii) Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, and riveting.
iii) One simple job involving sheet metal operations and riveting.

Unit 5 ELECTRICAL HOUSE WIRING 8

Practice on simple lamp circuits

i) One lamp controlled by one switch by surface conduit wiring,
ii) Lamp circuits- connection of lamp and socket by separate switches,
iii) Connection of Fluorescent lamp/tube light,
iv) Simple lamp circuits-in- stall bedroom lighting. And
v) Simple lamp circuits- install stair case wiring.

Unit 6 DEMONSTRATION 4

i) Demonstration of measurement of Current, Voltage, Power and Energy.
ii) Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories.
iii) Tools for Cutting and drilling.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines.
CO2 Draw and complete jobs as per specifications in allotted time.
CO3 Inspect the job for the desired dimensions and shape.
CO4 Operate, control different machines and equipment's adopting safety practices.

REFERENCE BOOK

1 S.K. Hajara Chaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015.
2 B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi2014.
3 K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad2014.
4 Kents Mechanical Engineering Hand book, John Wiley and Sons, NewYork.

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BS107: APPLIED CHEMISTRY LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

There are numerous number of materials used in fabricating and manufacturing devices for the comfort of life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. The course aims to supplement the factual knowledge gained in the lectures by first hand manipulation of processes and apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering problems.

LIST OF PRACTICALS:

Perform any 12 (twelve) Laboratory Practicals

VOLUMETRIC AND GRAVIMETRIC ANALYSIS

1. Preparation of standard solution of oxalic acid or potassium permanganate.
2. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
3. Standardization of $KMnO_4$ solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by $KMnO_4$ solution.
4. Iodometric estimation of copper in the copper pyriteore.
5. Volumetric estimation of total acid number (TAN) of given oil.
6. Volumetric estimation of
   a) Total hardness of given water sample using standard EDTA solution.
   b) Alkalinity of given water sample using 0.01M sulphuric acid
7. Proximate analysis of coal
   a) Gravimetric estimation moisture in given coal sample
   b) Gravimetric estimation ash in given coal sample

INSTRUMENTAL ANALYSIS

1. Determine the conductivity of given water sample.
2. Determination of the Iron content in given cement sample using colorimeter.
3. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
4. Determination of viscosity of lubricating oil using Red wood viscometer.
5. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.
6. To verify the first law of electrolysis of copper sulfate using copper electrode.
7. Construction and measurement of EMF of electro chemical cell (Daniel cell).
8. To study the effect of dissimilar metal combination.

Total 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Differentiate different methods of quantitative analysis.
CO2 Perform quantitative analysis using instruments.
CO3 Use various apparatus for precise measurements.
CO4 Construct different electrochemical cells used in developing batteries.
CO5 Appreciate methods of corrosion abetments.

TEXT BOOK

1 Text book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi,2017-18.
2 Dr. G. H. Hugarand ProfA.N.Pathak, Applied Chemistry Laboratory Practices, Vol.I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
3 Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd.,2014.

REFERENCE BOOK

1 Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi,2015.

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HS103: SPORTS AND YOGA

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

1 To make the students understand the importance of sound health and fitness principles as they relate to better health.
2 To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.
3 To create a safe, progressive, methodical and efficient activity based plan to enhance improvement and minimize risk of injury.
4 To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.

Unit 1 INTRODUCTION TO PHYSICAL EDUCATION

- Meaning & definition of Physical Education
- Aims & Objectives of Physical Education
- Changing trends in Physical Education

Unit 2 OLYMPIC MOVEMENT

- Ancient & Modern Olympics (Summer & Winter)
- Olympic Symbols, Ideals, Objectives & Values
- Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayan chand Award, Major Dhyan chand Khel Ratna Award etc.)

Unit 3 PHYSICAL FITNESS, WELLNESS & LIFESTYLE

- Meaning & Importance of Physical Fitness & Wellness
- Components of Physical fitness o Components of Health related fitness
- Components of wellness o Preventing Health Threats through Lifestyle Change
- Concept of Positive Lifestyle

Unit 4 FUNDAMENTALS OF ANATOMY & PHYSIOLOGY IN PHYSICAL EDUCATION, SPORTS AND YOGA

- Define Anatomy, Physiology & Its Importance
- Effect of exercise on the functioning of Various Body Systems. (Circulatory System, Respiratory System, Neuro-Muscular System etc.)

Unit 5 KINESIOLOGY, BIOMECHANICS & SPORTS

- Meaning & Importance of Kinesiology & Biomechanics in Physical Edu. & Sports
- Newton's Law of Motion & its application in sports.
- Friction and its effects in Sports.

Unit 6 POSTURES

- Meaning and Concept of Postures.
- Causes of Bad Posture.
- Advantages & disadvantages of weight training.
- Concept & advantages of Correct Posture.
- Common Postural Deformities – Knock Knee; Flat Foot; Round Shoulders; Lordosis, Kyphosis, Bow Legs and Scoliosis.
- Corrective Measures for Postural Deformities

Unit 7 YOGA

- Meaning & Importance of Yoga
- Elements of Yoga
- Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas
- Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana)
- Relaxation Techniques for improving concentration - Yog-nidra

Unit 8 YOGA & LIFESTYLE

- Asanas as preventive measures.
- Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana.
- Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana.
- Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana.
- Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana.
- Asthema: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

Unit 9 TRAINING AND PLANNING IN SPORTS

- Meaning of Training
- Warming up and limbering down
- Skill, Technique & Style
- Meaning and Objectives of Planning.
- Tournament – Knock-Out, League/Round Robin & Combination

Unit 10 PSYCHOLOGY & SPORTS

- Definition & Importance of Psychology in Physical Edu. & Sports
- Define & Differentiate Between Growth & Development
- Adolescent Problems & Their Management
- Emotion: Concept, Type & Controlling of emotions
- Meaning, Concept & Types of Aggressions in Sports.
- Psychological benefits of exercise.
- Anxiety & Fear and its effects on Sports Performance.
- Motivation, its type & techniques.
- Understanding Stress & Coping Strategies.

Unit 11 DOPING

- Meaning and Concept of Doping
- Prohibited Substances & Methods
- Side Effects of Prohibited Substances

Unit 12 SPORTS MEDICINE

- First Aid – Definition, Aims & Objectives.
- Sports injuries: Classification, Causes & Prevention.
- Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

Unit 13 SPORTS / GAMES

Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc.

- History of the Game/Sport.
- Latest General Rules of the Game/Sport.
- Specifications of Play Fields and Related Sports Equipment.
- Important Tournaments and Venues.
- Sports Personalities.
- Proper Sports Gear and its Importance.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.

CO2 Learn techniques for increasing concentration and decreasing anxiety which leads to stronger academic performance.
CO3 Learn breathing exercises and healthy fitness activities
CO4 Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.
CO5 Perform yoga movements in various combination and forms.
CO6 Assess current personal fitness levels.
CO7 Identify opportunities for participation in yoga and sports activities.
CO8 Develop understanding of health-related fitness components: cardiorespiratory endurance, flexibility and body composition etc.
CO9 Improve personal fitness through participation in sports and yogic activities.
CO10 Develop understanding of psychological problems associated with the age and lifestyle. First Year Curriculum Structure Common to All Branches 34
CO11 Demonstrate an understanding of sound nutritional practices as related to health and physical performance.
CO12 Assess yoga activities in terms of fitness value.
CO13 Identify and apply injury prevention principles related to yoga and physical fitness activities.
CO14 Understand and correctly apply biomechanical and physiological principles elated to exercise and training.

REFERENCE BOOK

1 Modern Trends and Physical Education by Prof. Ajmer Singh.
2 Light On Yoga By B.K.S. Iyengar.
3 Health and Physical Education – NCERT (11th and 12th Classes)

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HS105: COMMUNICATION SKILLS IN ENGLISH LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

Communication skills play an important role in career development. This lab course aims at actively involving students in various activities to improve their communication skills with an emphasis on developing personality of the students. Thus, the objectives of this course are:

1 To develop listening skills for enhancing communication.
2 To develop speaking skills with a focus on correct pronunciation and fluency.
3 To introduce the need for Personality development-Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc. for that purpose group discussion, extempore and other activities should be conducted during lab classes.

Unit 1 LISTENING SKILLS 7

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests.

Unit 2 INTRODUCTION TO PHONETICS 8

Sounds: consonant, vowel, diphthongs, etc. transcription of words (IPA), weak forms, syllable division, word stress, intonation, voice etc.

Unit 3 SPEAKING SKILLS 8

Standard and formal speech: Group discussion, oral presentations, public speaking, business presentations etc. Conversation practice and role playing, mock interviews etc.

Unit 4 BUILDING VOCABULARY 7

Etymological study of words and construction of words, phrasal verbs, foreign phrases, idioms and phrases. Jargon/ Register related to organizational set up, word exercises and word games to enhance self-expression and vocabulary of participants.

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Communicate effectively with an increase in their confidence to read, write and speak English fluently.

CO2 Demonstrate a significant increase in word power.

CO3 The variety of exercises and activities that will be conducted in the Language Lab will develop their skills needed to participate in a conversation like listening carefully and respectfully to others' view points; articulating their own ideas and questions clearly and overall students will be able to prepare, organize, and deliver an engaging oral presentation.

CO4 Develop non-verbal communication such as proper use of body language and gestures.

CO5 Communicate effectively with an increase in their confidence to read, write and speak English fluently.

TEXTBOOK

1 Daniel Jones. *The Pronunciation of English.* Cambridge: Cambridge University Press 1956.

2 James Hartman & etal. Ed. *English Pronouncing Dictionary.* Cambridge: Cambridge University Press, 2006.

3 Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed.2018)

REFERENCE BOOK

1 J.D.O'Connor. *Better English Pronunciation.* Cambridge: Cambridge University Press, 1980.

2 Lindley Murray. *An English Grammar: Comprehending Principles and Rules.* London: Wilson and Sons, 1908.

3 Margaret M. Maison. *Examine your English.* Orient Longman: New Delhi: 1964.

4 J.Sethi & et al. *A Practice Course in English Pronunciation*. New Delhi: Prentice Hall, 2004.
5 Pfeiffer, William Sanborn and T.V.S Padmaja. *Technical Communication: A Practical Approach*. 6th ed. Delhi: Pearson,2007.

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AU102: ENVIRONMENTAL SCIENCE

	L	T	P	C
COURSE OBJECTIVES	2	0	0	0

Technicians working in industries or elsewhere essentially require the knowledge of environmental science so as to enable them to work and produce most efficient, economical and eco-friendly finished products.

1 Solve various engineering problems applying ecosystem to produce eco – friendly products.
2 Use relevant air and noise control method to solve domestic and industrial problems.
3 Use relevant water and soil control method to solve domestic and industrial problems.
4 To recognize relevant energy sources required for domestic and industrial applications.
5 Solve local solid and e-waste problems.

Unit 1 ECO SYSTEM 9

Structure of ecosystem, Biotic & Abiotic components Food chain and food web. Aquatic (Lentic and Lotic) and terrestrial ecosystem. Carbon, Nitrogen, Sulphur, Phosphorus cycle.

Global warming -Causes, effects, process, Green House Effect, Ozone depletion

Unit 2 AIR AND, NOISE POLLUTION 9

Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler)

Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator)

Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler

Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000

Unit 3 WATER AND SOIL POLLUTION 9

Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation

Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary

Method: Membrane separation technology, RO (reverse osmosis).

Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

Unit 4 RENEWABLE SOURCES OF ENERGY 9

Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer, Solar stills.

Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas.

Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.

New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy

Unit 5 SOLID WASTE MANAGEMENT, ISO 14000 & ENVIRONMENTAL MANAGEMENT 9

Solid waste generation- Sources and characteristics of Municipal solid waste, E-waste, biomedical waste.

Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries.

Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste

Air quality act 2004, air pollution control act 1981 and water pollution and control act1996.

Structure and role of Central and state pollution control board.

Concept of Carbon Credit, Carbon Footprint.

Environmental management in fabrication industry.

ISO14000: Implementation in industries, Benefits.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

- CO1 Understand the ecosystem and terminology and solve various engineering problems applying ecosystem knowledge to produce eco – friendly products.
- CO2 Understand the suitable air, extent of noise pollution, and control measures and acts.
- CO3 Understand the water and soil pollution, and control measures and acts.
- CO4 Understand different renewable energy resources and efficient process of harvesting.
- CO5 Understand solid Waste Management, ISO 14000 & Environmental Management.

CO6 Different methods of teaching and media to be used to attain classroom attention.

CO7 Massive open online courses (MOOCs) may be used to teach various topics/sub topics.

CO8 15-20% of the topics which are relatively simpler of descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.

CO9 Micro-projects may be given to group of students for hand-on experiences

C10 Encouraging students to visit to sites such as Railway station and research establishment around the institution.

TEXT BOOK

1 S.C. Sharma & M.P. Poonia, Environmental Studies, Khanna Publishing House, NewDelhi

2 C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011. First Year Curriculum Structure Common to All Branches 52

3 Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099

4 Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.

5 O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi

6 Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.

7 Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07- 451871-8.

8 Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978, ISBN: 9780070354760.

9 Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford, UK; 2013. ISBN: 9780123978257.

10 Patvardhan, A.D, Industrial Solid Waste, Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6

11 Metcalf & Eddy, Waste Water Engineering, Mc-Graw Hill, New York, 2013, ISBN: 077441206.

12 Keshav Kant, Air Pollution & Control, Khanna Publishing House, New Delhi (Edition 2018)

13 Open source software and website address:

1) www.eco-prayer.org
2) www.teriin.org
3) www.cpcp.nic.in
4) www.cpcp.gov.in
5) www.indiaenvironmentportal.org.in
6) www.whatis.techtarget.com

7) www.sustainabledevelopment.un.org
8) www.conserve-energy-future.com

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SEMESTER II

BS102: MATHEMATICS - II

	L	T	P	C
COURSE OBJECTIVES	3	1	0	4

This course is designed to give a comprehensive coverage at an introductory level to the subject of matrices, Integral Calculus coordinate geometry, Basic elements of vector algebra and Testing of Hypothesis.

Unit 1 DETERMINANTS AND MATRICES 12

Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix in verse method to solve a system of linear equations in 3variables.

Unit 2 INTEGRAL CALCULUS 12

Integration as inverse operation of differentiation. Simple integration by substitution, by arts and by partial fractions (for linear factors only). Use of formulas $\int_0^{\frac{\pi}{2}} sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} cos^n x\, dx$ and $\int_0^{\frac{\pi}{2}} sin^m x\, cos^n x\, dx$ for solving problems Where m and n are positive integers.

Unit 3 CO-ORDINATE GEOMETRY 12

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. General equation of a circle and its characteristics. To find the equation of a circle, given:

i. Centre and radius,

ii. Three points lying on it and

iii. Coordinates of end points of a diameter;

Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

Unit 4 VECTOR ALGEBRA 12

Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

Unit 5 TESTING OF HYPOTHESIS 12

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean -Tests based on t for single mean, Chisquare and F distributions - Goodness of fit.

Total: 60 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Appreciate the importance of the Determinants are the factors that scale different parameterizations so that they all produce same overall integrals, i.e. they are capable of encoding the inherent geometry of the original shape.

CO2 Apply Integration for cumulative effect.

CO3 Relate the connection between algebra and geometry through graphs of lines and curves.

CO4 Apply the concept of testing of hypothesis for small and large samples in real life problems.

TEXTBOOK

1 B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.

2 G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.

3 S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.

REFERENCE BOOK

1 Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.

2 ReenaGarg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

3 Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

4 Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014

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BS103: APPLIED PHYSICS

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology based applications.

Unit 1 PHYSICAL QUANTITIES AND MEASUREMENTS 9

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS

and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications, Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error estimation and significant figures.

Unit 2 PROPERTIES OF MATTER 9

Elasticity: definition of stress and strain, moduli of elasticity (definition only), Hooke's law, stress-strain curve and its significance.

Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems.

Moment of inertia and its physical significance, Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).

Friction: concept, types, laws of limiting friction, coefficient of friction, and its engineering applications

Unit 3 HEAT 9

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), scales of temperature and their relationship, Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them, Coefficient of thermal conductivity, engineering applications.

Unit 4 WAVE MOTION AND OPTICS 9

Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, amplitude, phase, phase difference, Free, damped and forced vibrations with examples, resonance.

Basic optical laws: reflection and refraction, refractive index, image formation by lenses, lens formula, magnification, Simple microscope and its uses, Total internal reflection, Critical angle and conditions for total internal reflection, Lasers: Energy levels, spontaneous and stimulated emission; population inversion, laser characteristics, applications of lasers.

Unit 5 ELECTRICITY AND ELECTRONICS 9

Electric Current and its units, Resistance and its units, Conductance, Series and parallel combination of resistances. Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications, Capacitance and its units, Series and parallel combination of capacitors.

Insulator, semi-conductor, conductor, intrinsic and extrinsic semiconductors, p-n junction, junction diode, forward and reverse biased junction diodes, Transistor; description and three terminals, Working of PnP and NpN transistor.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to

CO1 Identify physical quantities, select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.

CO2 A) Explain Hooke's law and its significance.

B) Describe the viscosity of liquids, coefficient of viscosity and the various factors affecting its value and determine viscosity of an unknown fluid using Stokes' Law and the terminal velocity.

C) Describe forms of friction and methods to minimize friction between different surfaces.

CO3 A) Illustrate the terms; heat and temperature, measure temperature in various processes on different scales (Celsius, Fahrenheit, and Kelvin etc.).

B) Distinguish between conduction, convection and radiation; identify different methods for reducing heat losses and mode of heat transfer between bodies at different temperatures

CO4 Establish wave parameters: frequency, amplitude, wavelength, and velocity.

CO5 A) Illustrate the conditions for light amplification in various LASER and laser based instruments and optical devices.

B) Differentiate between insulators, conductors and semiconductors

TEXT BOOK

1 Text Book of Physics for Class XI & XII (Part-I, Part-II); N.C.E.R.T.,Delhi

2 Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill,Delhi.

3 Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. NewDelhi

4 A TEXT BOOK of Optics, N.Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.

REFERENCE BOOK

1 Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, NewDelhi

2 Engineering Physics by DK Bhhatacharya &Poonam Tandan; Oxford University Press,New Delhi.

3 Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.

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ES102: INTRODUCTION TO IT SYSTEM

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

This course is intended to make new students comfortable with computing environment - Learning basic computer skills, learning basic application software tools, Understanding Computer Hardware, Cyber security awareness

Unit 1 9

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals.

General understanding of various computer hardware components — CPU, Memory, Display, Keyboard, Mouse, HDD and other Peripheral Devices.

Unit 2 9

OS Installation (Linux and MS Windows), Unix Shell and Commands,*

Unit 3 9

Basics of HTML & CSS, Making Basic Personal Web-Page.

Unit 4 9

Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.
(MS-office)

Unit 5 9

Introduction of C language: History, Basic data type, Basic conditional statement, Simple program.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

- Comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/ attacks.

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ES104: FUNDAMENTALS OF ELECTRICAL, ELECTRONICS ENGINEERING

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

To provide basic knowledge of the different elements and concepts of electrical engineering field and to learn basic concepts of various active and passive electronic components, Signals, Op-Amp and their applications, Digital Electronics and their applications to help students deal with electrical and electronics engineering principles and applications in industrial processes of different fields.

Unit 1 OVERVIEW OF DIGITAL ELECTRONICS, ELECTRONIC COMPONENTS & SIGNALS 9

Passive & Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources. Boolean Algebra & Operations, Gates-Functional Block Approach, Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).

Unit 2 OVERVIEW OF ANALOG CIRCUITS 9

Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.

Unit 3 ELECTRIC AND MAGNETIC CIRCUITS 9

EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

Unit 4 A.C. CIRCUITS 9

Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, Power in A. C. Circuits, power triangle.

Unit 5 TRANSFORMER AND MACHINES 9

General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations and characteristic of motors.

Total: 45 Hour

REFERENCE BOOK

1 Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House
2 Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3 Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
4 Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405
5 Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924375
6 Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
7 Sedha, R.S., A TEXT BOOK of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978- 8121927833
8 Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13:
9 Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504

10 Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239

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ES106: ENGINEERING MECHANICS

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

Following are the objectives of this course:

1 To obtain resultant of various forces.
2 To calculate support reactions through conditions of equilibrium for various structures.
3 To understand role of friction in equilibrium problems.
4 To know fundamental laws of machines and their applications to various engineering problems.

Unit 1 BASICS OF MECHANICS AND FORCE SYSTEM 9

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force—-Orthogonal components of a force, moment of a force, Varignon's Theorem. Composition of forces – Resultant, analytical method for determination of resultant for concurrent, co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Unit 2 EQUILIBRIUM 9

Equilibrium and, Free body and Free body diagram, Analytical and graphical methods of analyzing equilibrium. Lami's Theorem – statement and explanation, Application for various engineering problems. Types of beam, supports (simple, roller and fixed) and loads acting on beam (vertical point load, uniformly distributed load). Beam reaction for cantilever, simply supported beam without overhang – subjected to combination of Point load and uniformly distributed load.

Unit 3 FRICTION 9

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane.

Unit 4 CENTROID AND CENTRE OF GRAVITY 9

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle). Centroid of composite figures composed of not more than three geometrical figures. Centre of Gravity of simple solids (Cube, cuboid, cone, and

cylinder).

Unit 5 SIMPLE LIFTING MACHINE 9

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility. Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Simple screw jack.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Identify the force systems for given conditions by applying the basics of mechanics.

CO2 Determine unknown force(s) of different engineering systems.

CO3 Apply the principles of friction in various conditions for useful purposes.

CO4 Find the centroid and centre of gravity of various components in engineering systems.

CO5 Select the relevant simple lifting machine(s) for given purposes.

TEXTBOOK

1 D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi(2008)

2 Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.

3 Bansal R K, A TEXT BOOK of Engineering Mechanics, Laxmi Publications

4 Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.

REFERENCE BOOK

1 Dhade, Jamadar &Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthiGruh.

2 Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cam- bridge University Press.

3 Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

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BS107: APPLIED PHYSICS LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

Study of Applied Physics aims to give an understanding of physical world by observations and predictions. Concrete use of physical principles and analysis in various fields of engineering and technology is very prominence. The course aims to supplement the factual knowledge gained in the lecture by first hand manipulation of apparatus. This will develop scientific temper and help to apply the basic concepts and principles in solving engineering and technology based problems. In addition, students get necessary confidence in handling equipment and thus learn various skills in measurement.

LIST OF PRACTICALS /ACTIVITIES (To perform minimum 10 practical's).

1. To measure length, radius of a given cylindrical object (test tube and beaker) using a Vernier Caliper and find volume of each object.
2. To determine diameter of a wire and thickness of cardboard using a screw gauge.
3. To find the co-efficient of friction between wood and glass using a horizontal board.
4. To determine force constant of a spring using Hooke's Law.
5. To find the moment of inertia of a fly wheel.
6. To find the viscosity of a given liquid (Glycerine) by Stoke's law.
7. Tomeasureroomtemperatureandtemperatureofahotbathusingmercurythermometer and convert it into different scales.
8. To determine focal length and magnifying power of a convex lens.
9. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
10. To verify Ohm's law by plotting graph between current and potential difference.
11. To verify laws of resistances in series and parallel combination.
12. To draw V-I characteristics of a semiconductor diode and determine its knee voltage.

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Select right kind of measuring tools (Meter scale, Vernier caliper, Screw gauge, etc.) for determining dimensions of physical quantities and make measurements with accuracy and precision.

CO2 Appreciate role of friction and measure co-efficient of friction between different surfaces.

CO3 Describe and verify Hooke's law and determine force constant of spring body.

CO4 Determine M.I. of a rotating body(flywheel)

CO5 Determine viscosity of a given liquid by stoke's law

CO6 Measure temperature under different conditions and different scales of temperature measurements.

CO7 Apply knowledge of optics to determine focal length and magnifying power of optical lenses.

CO8 Work with laboratory lasers and measure the wavelength of the light emitted from a laser.

CO9 Verify Ohm's law for flow of current.

CO10 Quantify resistances and verify laws of series and parallel combination of resistances.

REFERENCE BOOK

1 Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi

2 Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications(P)Ltd.,

3 Practical Physics by C. L. Arora, S. Chand Publication.
4 e-books/e-tools/ learning physics software/YouTube videos/websites etc.

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ES108: INTRODUCTION TO IT SYSTEMS LAB

L	T	P	C
0	0	2	1

COURSE OBJECTIVES

This Lab course is intended to practice whatever is taught in theory class of 'Introduction of IT Systems' and become proficient in using computing environment basic computer skills, basic application software tools, Computer Hardware, cyber security features, etc.

S. No.	Topics for Practice
1	Browser features, browsing, using various search engines, writing search queries
2	Visit various e-governance/Digital India portals, understand their features, services offered
3	Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4	Install Linux and Windows operating system on identified lab machines, explore various options, do it multiple times
5	Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6	Practice HTML commands, try them with various values, make your own Webpage
7	Explore features of Open Office tools, create documents using these features, do it multiple times
8	Explore security features of Operating Systems and Tools, try using them and see what happens.
This is a skill course. More you practice, better it will be.	

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

- Comfortably work on computer, install and configure OS, assemble a PC and connect it to external devices, write documents, create worksheets, prepare presentations, protect information and computers from basic abuses/attacks

REFERENCE BOOK

1 Online resources, Linux man pages, Wikipedia.
2 R.S. Salaria, Computer Fundamentals, Khanna Publishing House.
3 Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
4 Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and

5 Shell programming, by Mokhtar Ebrahim, Andrew Mallett.
6 IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme,
7 CISC Press, Pearson Education.
8 PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).

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ES110: FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S. No	Practical Outcomes (PrOs)	Approx. Hrs
1	Determine the permeability of magnetic material by plotting its B-H curve	02*
2	Measure voltage, current and power in 1-phase circuit with resistive load	02*
3	Measure voltage, current and power in R-L series circuit.	02*
4	Determine the transformation ratio (K) of 1-phase transformer	02
5	Connect single phase transformer and measure input and output quantities	02
6	Make Star and Delta connection in induction motor starters and measure the line and phase values.	02
7	Identify various passive electronic components in the given circuit	02
8	Connect resistors in series and parallel combination on bread board and measure its value using digital multimeter.	02
9	Connect capacitors in series and parallel combination on bread board and measure its value using multimeter	02*
10	Identify various active electronic components in the given circuit	02
11	Use multimeter to measure the value of given resistor	02
12	Use LCR-Q tester to measure the value of given capacitor and inductor	02
13	Determine the value of given resistor using digital multimeter to confirm with colour code.	02*
14	Test the PN-junction diodes using digital multimeter.	02*
15	Test the performance of PN-junction diode.	02
16	Test the performance of Zener diode	02
17	Test the performance of LED.	02

18	Identify three terminals of a transistor using digital multimeter	02
19	Test the performance of NPN transistor.	02*
20	Determine the current gain of CE transistor configuration	02
21	Test the performance of transistor switch circuit.	02
22	Test the performance of transistor amplifier circuit	02
23	Test Op-Amp as amplifier and Integrator	02
	Total	46

Total 30 Hours

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Understand basic principle and operation of electric circuits and machines.

CO2 Solve basic problems related to electrical circuits and machines. Explain the operation of different electrical technologies.

CO3 Demonstrate an understanding of the control systems.

CO4 Understand the basic circuit elements

CO5 Understand different types of signal waveforms.

CO6 Understand logic gates and apply them in various electronic circuits.

CO7 Understand the basic concepts of op-amps, and their applications.

CO8 Use relevant electric/electronic protective devices safely.

REFERENCE BOOK

1 Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House, 2018

2 Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5

3 Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353

4 Theraja, B. L., Electrical Technology Vol – I, S. Chand publications, New Delhi, 2015, ISBN: 9788121924405

5 Theraja, B. L., Electrical Technology Vol – II, S. Chand publications, New Delhi, 2015, ISBN: 9788121924375

6 Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513

7 Sedha, R.S., A TEXT BOOK of Applied Electronics, S.Chand ,New Delhi, 2008, ISBN-13: 978- 8121927833

8 Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Eduction, New Delhi,2015, ISBN-13: 0070634244-978

9 Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504

10 Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, New Delhi 2015 ISBN : 9780195425239

11 en.wikipedia.org/wiki/Transformer
12 www.animations.physics.unsw.edu.au//jw/AC.html
13 www.alpharubicon.com/altenergy/understandingAC.htm
14 www.electronics-tutorials
15 learn.sparkfun.com/tutorials/transistors
16 www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
17 www.technologystudent.com/elec1/transis1.htm
18 www.learningaboutelectronics.com
19 www.electrical4u.com

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ES112: ENGINEERING MECHANICSLAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

1 To obtain resultant of various forces.
2 To calculate support reactions through conditions of equilibrium for various structures.
3 To understand role of friction in equilibrium problems.
4 To know fundamental laws of machines and their applications to various engineering problems.

List of Practical to be performed:

1 To study various equipments related to Engineering Mechanics.
2 To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3 To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4 Derive Law of machine using Worm and worm wheel.
5 Derive Law of machine using Single purchase crab.
6 Derive Law of machine using double purchase crab.
7 Derive Law of machine using Weston's differential or wormed geared pulley block.
8 Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
9 Determine resultant of concurrent force system graphically.
10 Determine resultant of parallel force system graphically.
11 Verify Lami's theorem.
12 Study forces in various members of Jib crane.
13 Determine support reactions for simply supported beam.
14 Obtain support reactions of beam using graphical method.
15 Determine coefficient of friction for motion on horizontal and inclined plane.
16 Determine centroid of geometrical plane figures.

Total: 30 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Identify the force systems for given conditions by applying the basics of

mechanics.

CO2 Determine unknown force(s) of different engineering systems.

CO3 Apply the principles of friction in various conditions for useful purposes.

CO4 Find the centroid and centre of gravity of various components in engineering systems.

CO5 Select the relevant simple lifting machine(s) for given purposes.

TEXT BOOK

1 Bedi D.S., Engineering Mechanics, Khanna Publishing House

2 Khurmi, R.S., Applied Mechanics, S.Chand & Co. New Delhi.

3 Bansal R K, A TEXT BOOK of Engineering Mechanics, Laxmi Publications

4 Ramamrutham, Engineering Mechanics, S.,S Chand & Co. New Delhi.

REFERENCE BOOK

1 Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.

2 Ram, H. D.; Chauhan, A. K. Foundations and Applications of Applied Mechanics, Cambridge University Press.

3 Meriam, J. L., Kraige, L.G. , Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

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SEMESTER III

HTPC201: TEXTILE FIBERS

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to learn about

1 The fundamental concepts of polymerisation and fibre spinning techniques

2 The classification of fibres and fibre structure

3 The natural vegetable fibres, manufacture of regenerated fibres, properties and uses

4 The natural polyamide and manufacture of synthetic polyamide fibres, properties and uses

5 The manufacture of synthetic fibres, properties and uses

Unit 1 POLYMER TO FIBRE CONVERSION 9

Terminologies: repeat unit, mer-weight, polymerisation, degree of polymerisation, polymer molecular weight; Polymerization – Techniques; classification of polymers - Homo polymer, Co - polymer, Atactic, Syndotactic and Isotactic polymer, Man-made fibre spinning techniques – Melt and solution spinning techniques, Polymer selection and preparation. Post spinning operation - drawing, types of heat setting, influence of heat setting on fibre behaviour; Spin finish composition and application; Brief study of principles of Draw and Air – jet Texturising

Unit 2 BASICS OF TEXTILE FIBRE 9

Definition of Textile Fibres, Classification of fibres; study of morphological structures of fibres; Terminology related to Fibres**:** Introduction to common forms of textile fibres; staple fibre, filament tow UDY, POY and FOY; Dope dyed and delustered fibres. Types of yarn – spun, continuous filament, mono filament, and multi filament, flat and textured yarn – single, ply and cabled yarns; Physical properties of fibres - Essential and desirable properties of Textile Fibres. Order and disorder of fibres - Concept of Crystallinity and Orientation

Unit 3 CELLULOSE FIBRES 9

Natural vegetable fibres – Cotton, linen, jute and hemp - chemical composition - physical and chemical properties - uses. Regenerated fibres – Viscose and, polynosic rayon fibres manufacturing process, physical and chemical properties uses.

Unit 4 POLYAMIDE FIBRE 9

Silk – Life cycle of silk worm, types of silk, rearing, reeling, spun silk producing techniques, throwing and weighting. chemical composition, physical and chemical properties and uses. Wool - Varieties, grading, fibre extraction, chemical composition, physical, chemical and properties and uses. Nylon6, Nylon 66 – manufacturing process, physical, chemical properties and uses

Unit 5 SYNTHETIC FIBRES 9

Polyester, polyethylene, polypropylene, acrylic - manufacturing process, physical, chemical properties and uses. Introduction to aromatic polyamides - manufacturing process, physical, chemical properties and uses

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Define terminologies related to polymerisation and explain different spinning techniques

CO2 Categorize textile fibres and concept of fibre structure

CO3 Explain the cultivation, properties, uses of natural cellulosic and manufacturing of regenerated cellulose fibres, properties and uses

CO4 Describe the production process, properties and uses of polyamide fibres

CO5 Discuss the manufacturing processes, properties, uses of synthetic fibres and principles of texturizing

TEXT BOOK

1 Gupta, V.B., Kothari, V.K., Manufactured Fibre Technology, Springer Netherlands, 1997

2 S P Mishra, Fibre Science and Technology, New-Age International Ltd...New Delhi, 199

3 Vaidya A A, Production of Synthetic Fibres, Prentice Hall of India, New

Delhi, 1988

REFERENCE BOOK

1 Cook Gordon J, Hand Book of Textile fibre, Vol.I and II, , WoodheadFibre Science series, UK, 1984

2 Ed. M Lewin and E M Pearce, Hand Book of Fibre Chemistry, Mercel Dekker Inc., 1998

3 Shenai V A, TextileFibre, Sevak Publications, Mumbai

4 R.W. Moncrieff, Manmade Fibres, , Butterworth, London

5 Gowariker V R, Viswanathan N V and Sridhar J, Polymer Science, , New Age International Ltd., New Delhi, 1996

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HTPC202: YARN MANUFACTURING TECHNOLOGY

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to learn about

1 Basic principles and method of working of various machinery involved in various fiber preparatory process involved in yarn manufacturing process.

2 Principles and method of working of ring spinning process and post spinning processes

3 Calculation of production, draft, twist and other particulars pertaining to yarn manufacturing process

Unit 1 INTRODUCTION TO GINNING AND BLOWROOM PROCESSES 9

Process flow chart of carded and combed yarns; Objective, description and working of different types of Gins; Objectives, principles and description of opening, cleaning and blending machines used in blow room; Lap feed and chute feed systems; cleaning efficiency and production calculations in blow room.

Unit 2 CARDING PROCESS 9

Objectives of carding - carding action - stripping action - passage of material through high production card; Description and functions of mote knives, under casing, back plate, front plate, flats, heel and toe arrangement; Web doffing systems; Coiler mechanism - functions - types of coilers; Auto levellers to enhance the quality of sliver – principles and working ; Carding machine production calculations.

Unit 3 COMBING PROCESS 9

Objectives and advantages of combing process; Lap preparation techniques - Comber lap preparatory machines – Description and passage of material through sliver lap machine, ribbon lap machine and super lap formers; Passage of material through a modern comber - operations of combing cycle (Feeding, nipping, combing, detaching and top combing) - forward feed - backward feed –half lap –

unicomb - piecing wave - Production calculation in preparatory to combing and combing machines

Unit 4 DRAW FRAME AND SPEED FRAME 9

Objectives of draw frame; Description of draw frame and passage of material through a high speed draw frame; drafting systems used in modern draw frames; auto-levelling - open loop and closed loop auto levellers; draft and production calculations in draw frame; Speed frame - Objectives - description and passage of material; Draft, Twist and Production calculations in speed frame

Unit 5 RING SPINNING, BUNDLING AND BALING PROCESSES 9

Ring spinning - Principle of yarn formation – description and passage of material through ring spinning machine - design features and functions of important elements of ring spinning machine; modern developments in ring spinning machines; draft, twist and production calculations in ring spinning machine; Reeling - Objectives description and working principle of the Reeling Objectives – Bundling and Baling - description and working principle of the bundling and baling presses

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Describe the function and mechanism of ginning machine and, opening and cleaning machines

CO2 Explain the carding process, working of carding machine and functions of various parts

CO3 Explain the importance of combing processes in enhancing the quality of yarn produced.

CO4 Illustrate principle and working of draw frame and speed frame machines

CO5 Illustrate principles and working of ring spinning process and post spinning machines.

TEXT BOOK

1 Oxtoby E., "Spun Yarn Technology ". Butterworth. London, 1987

2 Klein W., "The Technology of Short-staple Spinning ", The Textile Institute, Manchester. 1998

3 Klein W., "A Practical Guide to Opening and Carding ". The Textile Institute, Manchester, 1999.

4 Klein W., "A Practical Guide to Combing, Drawing and Roving Frame ", The Textile lnstitute, Manchester, 1999

REFERENCE BOOK

1 Peter R Lord, "Handbook of Yarn Production: Technology, Science and Economics ", The Textile Institute, Manchester, 1999. Woodhead Publishing Ltd. And CRC Press LLC 2003.

2 Salhotra K.R. and Chattopadhyay R., "Book of papers on Blowroom and Card ", lndian Institute of Technology, Delhi, 1998.
3 Iredale J., "Yarn Preparation: A Handbook ", Intermediate Technology, 1992.
4 Indhira Doraiswamy, Chellamani P. and Pavendhan A., "Cotton Ginning, Textile Progress",The Textile lnstitute. Manchester, 1993.
5 Wyme.A, Textiles, The Motivate series, Macmillan Texts for Industrial Vocational and Technical Education, Germany.
6 Hannelore Eberie et al., Clothing Technology – Fibre to Fabric, Verlag Europa-Lehermittel, Nourney, Volmer GmbH & Co., Germany, 1996.
7 Sara J. Kadolph and Anna L. Langford, Textiles, Prentice Hall of Idia Limited, New Delhi, 2002

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HTPC203 : HANDLOOM WEAVING TECHNOLOGY

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To impart knowledge to students on

1 Identification of yarn packages and preparation of size recipe.
2 Basic terms, specifications and functions of weaving preparatory process and handloom machines
3 Basic mechanisms of handloom weaving process.
4 Count of yarns in different system of yarn numbering and conversion of one system to other.
5 Calculation of folded yarn count and various reed counts.

Unit 1 WEAVING PREPARATORY PROCESS 9

Different forms of yarn packages - hanks, cones, cheeses and spools - purpose and use; essential characteristic of warp and weft, yarn preparatory process; warping - peg warping, vertical warping and sectional warping; objective and importance of sizing of cotton yarn, ingredients used in size mixture and their functions, various forms of sizing- hank sizing and street warp sizing; illustrative size recipe for cotton, viscose and polyester - cotton blends; ideal sizing, common defects during sizing- causes and remedies.

Unit 2 HANDLOOMS AND SHED FORMATIONS 9

Evolution of handlooms - various parts of a handloom and their functions, types of handlooms - throw shuttle handloom, fly shuttle handloom, pit loom & frame loom; passage of warp in a fly shuttle handloom; motions of a handloom - primary, secondary & auxiliary motions; Different types of shed formations – centre closed shed, bottom closed shed, top closed shed, open shed and semi open shed; shedding mechanism of a handloom using treadles and heald reversing motions – roller system, pulley reversing system and jack and lam rod system.

Unit 3 PRIMARY AND SECONDARY MOTIONS OF HANDLOOMS 9

Handloom dobbies – lattice dobby, barrel dobby and bottom closed shed dobby – mechanism, working principles and suitability; design and essential features of a pit loom. Picking mechanism of a handloom, types of shuttles – throw shuttle, fly shuttle and roller shuttle, design and suitability; beat up - closed shed beating and crossed shed beating, different types of reed – bamboo reed, pith bound, steel reed and all metal steel reed, suitability for various fabrics; let off motion in handlooms – ratchet and pawl, rope and weight, rope-lever and weight; take up motion in handloom – poker rod and ratchet & pawl; auxiliary motions of a handloom – temple motion and terry motion;

Unit 4 YARN NUMBERING SYSTEMS AND ITS CONVERSIONS 9

Introduction to numbering of yarns; indirect system of numbering of yarns – New English cotton, spun silk and spun rayon, New French, metric, worsted, woolen Yorkshire, linen, direct system of numbering of yarns – Denier and flax/ jute/ hemp - Evolution of universal system of numbering – tex and its derivatives - millitex, kilotex;

Determination of conversion factors, conversion of count of yarn -indirect to indirect, conversion of count of yarn -direct to direct, conversion of count of yarn - indirect to direct, conversion of count of yarn - direct to indirect.

Unit 5 FOLDED YARN COUNTS AND REED COUNT SYSTEMS 9

Expression of count of folded yarns, contraction due to twisting, determination of Equivalent/Resultant count of folded yarns, amount of component threads in folded yarn, average count of warp, combination of different counts, material and system of counting; Reed Count, dents per linear space and groups of dents per linear space models, dents per linear space – Stockport-relation between reed count, number of ends per dent, cloth width, reed width and ends per inch- heald count Calculations.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Categorize the types of yarn packages and sizing of different kind of yarns.
CO2 Describe different types of handlooms and shed formations
CO3 Explain primary and secondary motions and other mechanisms of handloom
CO4 Calculate different types of yarn numbering systems
CO5 Calculate the folded yarn and various reed count systems

TEXT BOOK

1 Marks. R and Robbinson. A. T. C, “Principle of Weaving”, 1976.
2 Talukdar M. K., Sriramulu P. K. and Ajgaonkar D. B, “Weaving Machine,

Mechanism, Management",1998.
3 Banerjee N.N, "Weaving Mechanism", 1982.
4 Sengupta, "Weaving Calculation", 1963.
5 Ormerod. A and Sondhelm .W. S., "Weaving – Technology and Operations", 1995.
6 Goordev.V, "Cotton Weaving", 1979.
7 TAI, "Weaving Tablets", 2013.
8 Lord.P.R and Mohamad, "Weaving: Conversion from yarn to Fabric", 1982.

REFERENCE BOOK

1 Hanton, WA, "Mechanics for Textiles Student an Introduction to the study of mechanics for Textiles student", 1960.
2 Greenwood, Hony., "Hand book of weaving and manufacturing", 2nd Edition, 1954.
3 Rama Verma, "Handloom weaving", 1959.
4 David Ezakia, "Preparatory Process for weaving with calculation: including Development of the modern Power Loom".
5 Z Grosicki, "Watsons Textile Design and Colour ", 2nd Edition

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HTPC204 : FABRIC STRUCTURE- I

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To impart knowledge to students about

1 The classification of woven fabrics
2 The concept of design elements and features of basic weaves.
3 The construction of different kinds of basic weave structures
4 Toweling, fancy fabric weaves and colour and weave effect

Unit 1 INTRODUCTION TO TEXTILE DESIGNING 9

Classification of textile fabrics; classification of woven fabrics - simple, compound and complex; fundamental aspects of woven fabrics-count of graph paper, Methods of representing design on graph paper; Principle of Design, draft, denting, lifting & tie-up plans. Types of draft - straight draft, skipped draft, pointed draft, herring bone draft, mixed draft etc. Plain weave - ornamentation of plain weaves; study of derivative structures of plain weave – regular and irregular warp rib, weft rib, hopsack and basket weaves. Catch-cord technique; design, draft, denting, peg/tie-up plan and thread interlacing diagram of above weaves

Unit 2 TWILL WEAVES AND ITS DERIVATIVES 9

Study of twill weaves up to 12 threads; classification of twills - warp faced twill, weft faced twill and equal faced twill, Left hand twill and Right hand twill; angle of inclination of twill diagonals- Steep twill and Flat twill; influence of the twist direction of yarn over prominence of twill lines; study of derivatives of twill weaves - wavy twill, herringbone, transposed twill, broken twill, elongated twill, combined twill,

figured twill– Drafts, lifting plan & tie up, treadling plan for the above designs

Unit 3 DIAMOND AND SATIN WEAVES 9

Diamond weave, twill dice check, diaper; regular and irregular sateen and satin up to 12 threads, satin dice check weaves; design, draft, denting, peg/tie-up plan and thread interlacing diagram of above weaves. Difference between diamond and diaper, satin and sateen.

Unit 4 TOWELLING WEAVES 9

Study of honey comb weaves– ordinary honey comb, stitched honey comb and Brighton's honey comb designs- cell formation; study of Huck-a-Back weave- Construction of Standard Huck- a - Back (10 X 10), Devon's Huck– a– Back ;mock leno and corkscrew weaves. Design, draft, and peg/tie-up plan and thread interlacing diagram of above weaves

Unit 5 FANCY AND COLOUR AND WEAVE EFFECTS 9

Crepe weaves – construction upon sateen base, by combination of floating weaves with plain thread, by reversing and by insertion of one weave over another. Combination of weaves – twill and plain, mock-leno and plain, honey comb and plain, stripe and check effect by these combinations; Introduction to colour and weave effects- continuous line effect, hounds tooth patterns, bird's eye and spot effects, hairline stripes, step patterns and all over effects. Distorted thread effects – salient feature, warp and weft distortion.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Identify and construct plain weave and its derivatives
CO2 Create different twill weave structures and its derivatives
CO3 Draw the designs of Diamond and satin weaves
CO4 Develop woven fabric designs suitable for towels
CO5 Create fabric designs using different color and weave effects

TEXT BOOK

1 Grosicki Z. J., "Watson's Textile Design and Colour", Vol.1, Woodhead Publications, Cambridge England, 2004.
2 Grosicki Z. J., "Watson's Advanced Textile Design and Colour", Vol.II, Butterworths, London, 1989.
3 Grammar of Textile Design by H. NISBET, F.T.I.

REFERENCE BOOK

1 Wilson J., "Handbook of Textile Design", Textile Institute, Manchester, 2001.
2 Horne C.E., "Geometric Symmetry in Patterns and Tilings", Textile Institute, Manchester, 2000.
3 Seyam A. M., "Structural Design of Woven Fabrics, Theory and Practice", Textile Institute, Manchester, 2002.
4 Georner D, "Woven Structure and Design, part 1: Single Cloth Construction",

WIRA, U.K., 1986.
5 Georner D, “Woven Structure and Design, Part 2: Compound Structures”, WIRA, U.K., 1989.

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HTPC205 : CHEMICAL PROCESSING OF TEXTILES - I

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To make the students understand the process of pretreatments and dyeing of cotton , wool and silk fibres using various dye classes and machineries suitable for the respective process.

Unit 1 PRETREATMENT OF COTTON 9

Need for preparation of grey goods& preparatory process sequence for different process of cotton material.

Singeing, objective & methods of singeing - Gas singing machine description, working, precautions, merits & demerits. Desizing of cotton: objective, methods, special emphasis on Acid & enzyme desizing with merits & demerits. Scouring of cotton: objective, Chemistry, methods of scouring, Bleaching of Cotton: Objective,Chemistry, methods of bleaching, Hypochlorite & H_2O_2 bleaching, OBA Treatment. Mercerization of Cotton: Objective,Chemistry, methods of mercerization, merits and demerits.

Unit 2 DYEING – TERMINOLOGIES AND MACHINES 9

Classification of dyes, Dyeing Terminologies, Dyeing machineries: Kier, J-Box, Jigger, Winch, Padding Mangles, Cabinet Hank dyeing machines, package dyeing machine, HTHP Beam, Jet Dyeing, Soft Flow, Over Flow dyeing machine, Hydro extractor, Vertical Can dryer and Hot Air Stentor.

Unit 3 DIRECT AND REACTIVE DYEING OF COTTON 9

Dyeing cotton with Direct Dyes: Classification, Mechanism, Recipe, Process conditions with procedure. After treatment of direct dyed cotton material: Methods and special emphasis on cationic dye fixing agents.

Dyeing of cotton with Reactive Dyes: Classification, Mechanism, Recipe, Process conditions with procedure for M, H and VS dyes

Unit 4 VAT, AZOIC AND SULPHUR DYEING OF COTTON 9

Dyeing of cotton with Vat Dyes: Classification Mechanism, Recipe, Process conditions with procedure and concepts of Solubilised Vat Dyes. Dyeing of cotton with Azoic Dyes: Mechanism, Recipe, Process conditions with procedure. Dyeing of cotton with Sulphur Dyes: Classification Mechanism, Recipe, Process conditions with procedure, and its common problems viz. Tendering & Bronziness, etc.

Unit 5 PRETREATMENT AND DYEING OF WOOL AND SILK 9

Pretreatment of Silk: Degumming and its methods, bleaching with H_2O_2.

Dyeing of Silk with Acid & Metal Complex: Classification, Mechanism, Recipe, Process conditions with procedure.

Pretreatment &Setting of wool: Scouring and its methods, Milling, Potting, Crabbing, Decatising and Bleaching with H_2O_2.

Dyeing of Wool with Acid, Metal Complex, Chrome dyes: Mechanism, Recipe, Process conditions with procedure.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain the need and procedure for pre-treatments of cotton materials.

CO2 Classify dyes, define the dyeing terms and select the appropriate machine for the process.

CO3 Explain the process of dyeing cotton with direct and reactive dyes with suitable recipe and process conditions.

CO4 Describe the process of dyeing cotton with vat, azoic and sulphur dyes with suitable recipe and conditions.

CO5 Prepare the suitable recipe and procedure for the pre-treatment and dyeing of silk and wool materials.

TEXT BOOK

1 Chemical Processing of Textiles by Dr. C.V. Kaushik and Mr. Antao Irwin Josico, NCUTE

2 Technology of Scouring and Bleaching, Trotman E.R., Griffin, London, 1968.

3 Technology of Textile processing Vol. II, III & VI by Dr. V AShenai

4 Technology of Dyeing by Dr. V AShenai

5 Guide to Wet Textile Processing Machines by J. N. Shah, Elsevier Science & Technology

REFERENCE BOOK

1 Technology of Bleaching and Mercerizing, Shenai V.A., Sevak Publication, Bombay, Vol. - 3, 3rd edition, 2003

2 Textile Bleaching, Steven A.B., Pitman and Sons, London.

3 Textile Preparation and Dyeing, Asim Kumar Roy Choudhury, Oxford and IBH Publishing Co. Pvt. Ltd., 2006

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HTPC 206 : HANDLOOM WEAVING TECHNOLOGY LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	4	2

To impart knowledge to students on

1. Different parts of handloom and weaving preparatory process
2. Development of design, draft, peg plan and tie up plan for handloom weaving
3. Various processes in weaving to develop the fabric sample

List of Experiments

1. Sketching and familiarizing of different functional parts of handloom.
2. Sketching and practice of various knots and piecing
3. Practice of bobbin and pirn winding
4. Practice of warping on peg warping frame and sectional warping machine
5. Study of preparation of design, draft, peg plan & tie –up plan and practice
6. Practice of drawing-in and denting
7. Practice of gaiting-up.
8. Practice of tie- up and handloom setting.
9. Practice of weaving.
10. Development of samples with Plain weave and its derivatives
11. Development of samples with Twill weave and its derivatives.
12. Preparation of lattice with pegs for handloom dobbies for various weaves

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

- CO1 Sketch and identify the different parts of handloom
- CO2 Perform various weaving preparatory processes.
- CO3 Draw a design, draft and peg-plan for the given fabric sample
- CO4 Adjust the settings of handloom to produce given fabric sample
- CO5 Prepare the lattices for various dobby designs

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HTPC 207 : FABRIC ANALYSIS AND COSTING LAB – I

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

To impart knowledge to students on analysis of weave and fabric particulars

List of Experiments

1. Analysis of weave, constructional details and weaving techniques of fabrics with plain weave
2. Analysis of weave, constructional details and weaving techniques of fabrics with plain weave derivatives for its production
3. Analysis of weave, constructional and weaving techniques of fabrics with different types of twill weaves for its production

4 Analysis of weave, constructional and weaving techniques of fabrics with satin and sateen weaves for its cloth production
5 Analysis of weave, constructional and weaving techniques of honey comb fabrics
6 Analysis of weave, constructional and weaving techniques of Huck a back fabrics

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Draw the structure of woven fabrics with different weaves
CO2 Extract the weave from the given sample and draw the weave, draft and peg- plan for re-production

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HTPC 208 : CHEMICAL PROCESSING OF TEXTILES LAB - I

	L	T	P	C
COURSE OBJECTIVES	0	0	4	2

To enable the students to perform pre-treatment and dyeing of cotton, wool and silk materials

List of Experiments

1 Desizing of cotton with Acid and Enzyme.
2 Scouring of cotton.
3 Bleaching of cotton with hydrogen peroxide and Hypochlorite
4 Dyeing of cotton with Direct dyes.
5 Dyeing of cotton with Reactive dyes.
6 Dyeing of cotton with Vat dyes.
7 Dyeing of cotton with Azoic dyes.
8 Dyeing of cotton with Sulphur dyes.
9 Study the effect of Liquor Ratio, Electrolytes & Temperature on any one class of dye.
10 Degumming & Bleaching of silk
11 Scouring & Bleaching of Wool
12 Dyeing of Silk & Wool with Acid dyes.
13 Dyeing of Silk & Wool with Metal Complex dyes

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to perform

CO1 Pretreatments of cotton, wool and silk material.
CO2 Dyeing of cotton with direct, reactive, vat, azoic and sulpur dyes using appropriate recipe for the given shade
CO3 Dyeing of wool and silk with acid and metal complex dyes using appropriate recipe for the given shade
CO4 The analysis of the effect of MLR, electrolyte and temperature on dyeing of cotton.

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SEMESTER IV

HTPC 209: WEAVING TECHNOLOGY - I

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To facilitate the students to learn about the

1. Principle and working of warp winding and pirn winding process.
2. Mechanism and principle of warping & sizing process and related calculations
3. Different primary motions in tappet loom and dobby loom.
4. Various secondary and auxiliary motions
5. Working principle of multiple box motions and production calculation in loom

Unit 1 WINDING 9

Objectives – Passage of yarn and Working principle of Precision winding machines and drum winding machines. Tensioning devices – Mechanical yarn clearer- slub catcher: fixed blade, adjustable blade, spring type. Electronic yarn clearer; photo-electric and capacitance type – Splicing; difference between knotting and splicing. Ribbon breaking devices. Objectives – Working principle of pirn winding machines - characteristics of pirn package. Yarn & Package faults. Yarn winding calculations – cone, cheese and pirn– efficiency, production and production planning.

Unit 2 WARPING AND SIZING 9

Modern high speed beam warping machine – mechanism and working principle, Sectional warping machine – mechanism and working principle. Working principle of Multi cylinder sizing machine. Mill warping calculations – efficiency, production, creel capacity, number of back beams, amount of yarn, wastage and production planning; Sectional warping calculation – creel capacity, no of sections, no of patterns per sections, width of warp and total no of ends; Sizing calculations – size pick up, efficiency, production and production planning

Unit 3 POWERLOOM WEAVING 9

Introduction to power loom – primary, secondary and auxiliary motions of a power loom; tappet shedding and reversing motions - early shedding, late shedding; designing of tappets for plain and 4 thread twill weaves; powerloom dobby – climax dobby, mechanism and working principle, lattices and pegging. Picking mechanism – scope of over-pick and under-pick mechanism, cone over-pick mechanism – mechanism and working principle; under-pick mechanism – mechanism and working principle, parallel motion, early picking and late picking.

Unit 4 BASIC AUTOMATION IN POWERLOOM 9

Beat-up mechanism – eccentricity of sley, timing and synchronization of primary motions; seven wheel take up motions; negative let-off motion. Warp protective

motions – loose reed and fast reed motions, mechanism and working principle; weft detection motions – side weft fork and centre weft fork motions, mechanism and working principle. Temples – necessity and types of temples.

Unit 5 AUTOMATIC POWERLOOM 9

Multiple box motion; drop box – mechanism and working principle; automatic powe rlooms – introduction; mechanical warp stop motion; weft replenishment mechanism - shuttle changing & cop changing mechanisms; Fabric production calculations of automatic power looms, preparation of lay-out for a loom shed.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Discuss the concept and mechanism of warp winding and weft pirn winding.

CO2 Explain the mechanism and principle of warping & sizing process and estimate size pick up and production.

CO3 Summarize the working mechanism of primary motions in tappet and dobby loom

CO4 Elaborate the various secondary and auxiliary motions in power loom

CO5 Demonstrate the drop box motion, stop motions and production calculations in power loom.

TEXT BOOK

1 Marks R. and Robinson T.C., “Principles of Weaving”, The Textile Institute, Manchester, 1989.

2 Sabit Adanur, “Handbook of Weaving”, Technomic Publishing Co. Inc., 2001

3 Ormerod A. and Sondhelm W.S., “Weaving: Technology and operations”, Textile Institute, 1995.

REFERENCE BOOK

1 Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B., “Weaving: Machines, MechanismsManagement”, Mahajan Publishers, Ahmedabad, 1998.

2 Booth J.E., “Textile Mathematics Volume 3”, The Textile Institute, Manchester, 1977.

3 Lord P.R. and Mohamed M.H., “Weaving: Conversion of Yarn to Fabric”, Merrow, 1992.

4 Vangheluwe L., “Air- Jet Weft Insertion”, Textile progress, Vol. 29, No. 4, Textile Institute Publication, 1999.

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HTPC210 : FABRIC STRUCTURE- II

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

To impart knowledge to students on

1 Multi-layer fabrics and their production.

2 Construction of weave, draft, peg plan for the production of compound and complex structures

3 Design preparation suitable for figured single cloth jacquard weaving

Unit 1 CORDED AND RIB STRUCTURES 9

Bedford cord weaves – salient features, plain faced Bedford cord (regular and alternate pick principle), twill faced bed ford cord, wadded bed ford cord, and crepon Bedford cords. Welt & Pique structures – salient features and manufacturing techniques, ordinary structure, wadded structure (loose back and fast back); Difference between welts and piques, Difference between Bedford cord and welt. Design, draft, denting, peg/tie-up plan and thread interlacing diagram of above weaves.

Unit 2 DOUBLE LAYER CLOTH AND ITS TYPES 9

Double cloth – classification, Step by step construction of self-stitched double cloth, reversible and non-reversible varieties using twill, sateen and satin; Centre stitched double cloth; double width plain cloth, plain Tubular cloth. Thread interchanging double cloth- warp thread interchanging double cloth ,weft thread interchanging double cloth, Cloth interchanging double cloth using plain and twill weaves; Stripes and check effects using cloth interchanging principle; wadded double cloth – warp wadding and weft wadding. Design, draft, denting, peg/tie-up plan and thread interlacing diagram of above weaves.

Unit 3 TREBLE CLOTH AND BACKED CLOTH 9

Treble width plain cloth – interlacement diagram and its graphical representation; Treble cloth using twill, satin, and sateen. Backed cloths- warp & weft backed cloths- warp wadded and weft wadded backed cloth-Reversible and non-reversible using twill, sateen and satin -Imitation backed cloth, imitation warp and weft backed cloths. Design, draft, denting, peg/tie-up and thread interlacing diagram of above weaves.

Unit 4 COMPOUND WEAVE STRUCTURE- PILE WEAVE 9

Pile fabrics – Salient features, classification of pile fabrics- loop pile and cut pile; warp pile and weft pile. Terry piles – salient features, terry mechanism; classification of terry pile structures – 3 pick, 4 pick, 5 pick and 6 pick terry, graphical representation and thread interlacement diagram. Basic principles and weaves of warp pile fabrics produced with the aid of wires and face to face weaving. Construction of Weft pile designs - Construct Plain back, Twill back pile designs, Corded velveteen- design, draft, denting, peg plan, tie-up and thread interlacing diagram of above weaves.

Unit 5 INTRODUCTION TO COMPLEX WEAVES AND JACQUARD FIGURED DESIGN 9

Principles of Cross weaving-Various types of sheds formed in cross weaving - Construction of plain gauze & leno – Drafting, lifting plan, thread diagram & graphical representation. Construction of extra warp and extra weft designs -

Importance of extra warp and extra weft figuring in ornamentation of fabrics. Introduction of Construction and development of jacquard designs. Count of graph paper- Factors influencing the selection of appropriate count of graph paper. Study of Figured single cloth - structure of cloth with different weaves combination-Design development and punching process by using straight tie and straight draft

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Sketch corded and rib structures using basic weaves
CO2 Create double cloth structures using different methods
CO3 Construct treble cloth and backed cloth structures
CO4 Select different weaves to produce compound fabric structures
CO5 Develop the designs for complex fabric structures

TEXT BOOK

1 Grosicki Z. J., "Watson's Textile Design and Colour", Vol.1, Woodhead Publications, Cambridge England, 2004.
2 Grosicki Z. J., "Watson's Advanced Textile Design and Colour", Vol.II, Butterworths, London, 1989.
3 Grammar of Textile Design by H. NISBET, F.T.I.

REFERENCE BOOK

1 Georgmar D. Woven Structure and Design Part I Single Cloth Construction WIRA UK 1986
2 Georner D, "Woven Structure and Design, Part 2: Compound Structures", WIRA,U.K., 1989.
3 X. Chen,M. Spola,J. Gisbert Paya &P. Mollst Sellabona1,Experimental Studies on the Structure and Mechanical Properties of Multi-layer and Angle-interlock Woven Structures, Pages 91-99

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HTPC211 : CHEMICAL PROCESSING OF TEXTILES – II

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To facilitate the students to understand

1 the process of pretreatments and dyeing of polyester materials, dyeing defects and its remedies,
2 various methods and styles of printing
3 recipe and procedure for direct style printing on cotton ,silk and polyester various mechanical and chemical finishes

Unit 1 PRETREATMENT AND DYEING OF POLYESTER 9

Pretreatment of Polyester: Scouring and bleaching with sodium chlorite. Heat

Setting: Objective & Methods. Dyeing of Polyester with Disperse dyes: Mechanism, Recipe, Process conditions with procedure for Carrier, HTHP & Thermosol dyeing. Dyeing defects, damages and their remedies.

Unit 2 INTRODUCTION TO PRINTING 9

Textile Printing: Differences in Dyeing and Printing, Printing paste ingredients and their functions. Methods of printing viz. Block Printing, Screen Printing, Rotary and Flatbed Screen Printing and Transfer Printing with their merits and demerits. Brief outlines of Styles of Printing viz. Direct, Resist and Discharge Printing. Traditional styles of Printing viz. Tie & dye, Kalamkari and Batik printing. After Treatments in printing: Steaming, Ageing and Curing.

Unit 3 DIRECT STYLE OF PRINTING 9

Printing of cotton with Direct dyes, Reactive dyes in direct style: recipe & Procedure.
Printing of cotton with Pigments: recipe & Procedure
Printing of Silk with Acid dyes: recipe & Procedure
Printing of Polyester with Disperse dyes: recipe & Procedure

Unit 4 INTRODUCTION AND MECHANICAL FINISHES 9

Textile Finishing: Object & factors affecting selection of finishes.
Classification: Mechanical and Chemical Finishes, Temporary and Permanent Finishes.
Mechanical Finishing: Calendaring, Sanforizing, Raising or Napping, Shearing and Sueding.

Unit 5 CHEMICAL FINISHES 9

Chemical finishing: Wrinkle-resist finishing, Softening, Stiffening, Waterproof, water repellent, Soil repellency, soil release, Antistatic, flame retardant and flame resistant finish

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain the process of pre-treatment and dyeing of polyester fabrics.
CO2 Describe various methods and styles of printing and select suitable print paste ingredients for the printing process.
CO3 Explain the process of direct style of printing of various fabrics with suitable recipe and procedure.
CO4 Classify textile finishes; explain the process of calendaring and sanforising
CO5 Summarize the various chemical finishing treatments.

TEXT BOOK

1 Textile Dyeing by Dr. N. N. Mahapatra, Woodhead Publishing India in Textiles.

2 Chemical Processing of Textiles by Dr. C.V. Kaushik and Mr. Antao Irwin Josico, NCUTE
3 An Introduction to Textile printing by W Clarke.
4 Textile Finishing by R. S. Prayag
5 Technology of Textile Finishing by Dr. V.A. Shenai.

REFERENCE BOOK

1 Handbook of Textile processing machinery – R.S. Bhagwat1999
2 Dyeing and Chemical Technology of Textiles Fibres by E.R. Trotman
3 Chemical Finishing of Textiles by W.D. Schindler and P.J. Hauser.
4 A Handbook of Textile Finishing by A.J. Hall
5 Principles of Textile Finishing by Asim Kumar Roy choudhury

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HTPC212 : TEXTILE TESTING – I

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to learn about

1 Sampling methods for testing of textile materials.
2 The moisture properties of textiles and its measurement.
3 The Determination of fibre length, fineness and maturity properties
4 The Determination of tensile properties of fiber and yarn.
5 The determination of Yarn count, Twist and mass evenness

Unit 1 SAMPLING 9

Definition of quality- importance of quality assessment- selection of samples for quality assessment – random and biased samples – squaring technique and zoning technique for fibre Selection; Yarn sampling - use of random numbers - sampling for various types of yarn tests

Unit 2 MOISTURE RELATED PROPERTIES OF TEXTILES 9

Atmospheric conditions - absolute humidity, relative humidity, standard atmospheric testing conditions; Measurement of atmospheric conditions - Instruments used for determination of Relative Humidity – Wet and dry bulb hygrometer; Concept of Moisture Regain and Moisture Content – Relation between Regain and Content- Corrected yarn count in standard regain value; Effect of Moisture on fibre properties – Factors affecting Moisture Regain of textile materials – Standard regain value of textile fibres ; Methods of Measurement of Moisture Regain and Moisture Content - Moisture Testing Oven

Unit 3 FIBER LENGTH, FINENESS AND MATURITY 9

Fibre testing, the fibre quality index and spinnablity; Fibre length and length uniformity measuring techniques. Fibre fineness – definition - its importance in yarn

manufacture; measurement techniques. Cotton fibre maturity, estimation by microscopic method - maturity ratio and index, estimation by other methods – optical, air flow differential dyeing; its importance in spinning.

Unit 4 TENSILE PROPERTIES OF FIBER AND YARN 9

Tensile testing of Textiles – Introduction – Terminology and definitions; The Load and elongation curve – The stress and strain curve. Tensile strength testing modes – CRT, CRE and CRL; Factors affecting the test results obtained from testing instruments. Fibre strength measurement – stelometer; Pendulum lever principle (CRT) – single yarn strength tester, Inclined plane principle (CRL) - Scott IP Tester, Strain gauge principle (CRE) – Lea strength – CSP, merits & demerits.

Unit 5 YARN COUNT, TWIST AND MASS EVENNESS 9

Count measuring systems. Measurement of Yarn Count - weighing balance method, Knowles balance, Quadrant balance, Beasley's balance. Significance of Yarn Twist - Twist direction - Twist factor and Twist Multiplier. Twist angle - function of twist in yarn structure – Twist and yarn strength – Effect of twist on fabric properties; Measurement of twist using Straightened fibre method, Twist contraction method. Yarn mass evenness parameters – measurement – electronic mass evenness determination – Yarn fault classification

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Use sampling methods for textile materials

CO2 Describe moisture and its effect and relation with other properties of textile material.

CO3 Analyse fibre length, fineness and maturity properties and their measurement

CO4 Determine the tensile strength of fiber and yarn

CO5 Explain significance of yarn count, twist and evenness and their measurement.

TEXT BOOK

1 Booth J.E., "Principle of Textile Testing", Butterworth Publications, London, 1989

2 Saville B.P., "Physical Testing of Textiles", Textile Institute, Manchester, 1998

3 Kothari V. K., "Testing and Quality Management", Progress in Textile Technology Vol.1, IAFL Publications, New Delhi, 1999

4. Amutha, K., A Practical Guide to Textile Testing. CRC Press, 2016.

REFERENCE BOOK

1 Ruth Clock and Grace Kunz., "Apparel Manufacture – Sewn Product Analysis", Upper Sadle River Publications, New York, 2000

2 Pradip V. Mehta., “Managing Quality in the Apparel Industry”, NIFT Publication, India, 1998
3 Sara J. Kadolph., “Quality Assurance for Textiles and Apparels”, Fair child Publications, New York,1998
4 Slater K., “Physical Testing and Quality Control”, The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993
5 Textile testing web course content https://nptel.ac.in/courses/116/102/116102029/#

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HTPC 209 : COLOUR CONCEPTS AND TEXTILE DESIGN LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	2	1

To impart knowledge to students on

Drawing small figures and motifs, Colour theory and its effect on weaves and Arrangement of motifs with different bases

List of Experiments

1 Practice on drawing types of Lines
2 Practice on drawing direction of Lines
3 Practice on Variation of Lines
4 Practice on foliage drawing like small plants, flowers and creepers
5 Practice on developing traditional motifs like birds, animals and flowers
6 Prepare Colour Wheel (Primary, Secondary and Tertiary Colours)
7 Practice chart for colour schemes
- Monochromatic
- Analogous
- Achromatic
- Complementary colour
  - Single Complementary
  - Double Complementary
  - Split Complementary
- Triadic

8 Create Simple colour & weave effects in design paper by applying colour schemes for the following
- stripes
- checks
- step pattern
- Hound’s-tooth patterns

9 Apply colour schemes for special colour and weave effects for rib and corkscrew weaves
10 Apply colour schemes for figured colour and weave effects for the following
- Simple and compound order of colouring

- Distinct figured effects

11 Arrange motifs or figures in different bases for drop device and drop reverse design
   - Diamond base, Ogee base, Diagonal wave line base and Rectangular base

12 Arrange motifs or figures in different bases for Sateen system of distribution
   - Regular and irregular sateen arrangement
   - Layout preparation for shirting, Dothi, saree and chudidar

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Draw different lines and apply in designing motifs
CO2 Apply the Light and pigment colour concepts in design development
CO3 Create different colour and weave effects

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HTPC214: WEAVING TECHNOLOGY LAB

	L	T	P	C
COURSE OBJECTIVES	0	0	4	2

To facilitate the students to learn about

1 Operation and working of various weaving preparatory machines.
2 Fabric samples development for basic weaves on handloom
3 Erection and setting of basic weaving mechanisms practically
4 Samples development for saree and dhoti borders using handloom dobby.

List of Experiments

1 Study the material passage, setting of tensioners, slub catchers and production calculation in cone winding machine.
2 Study the material passage and production calculation in pirn winding machine.
3 Study the material passage and production calculation in warping / sectional warping machine.
4 Development of samples with satin/ sateen weaves on handlooms
5 Development of samples with diamond, honey comb, diaper weaves on handlooms.
6 Development of samples with mock leno and huck-a-back weaves on handlooms.
7 Development of samples with distorted tread effect, backed cloth etc., on handlooms
8 Sketching and acquiring knowledge of different functional parts of Power loom.
9 Practice of erection and setting of tappet shedding mechanism
10 Practice of erection and setting of over-pick and under-pick mechanisms

11 Practice of erection and setting of beat-up mechanism and control of sley eccentricity.
12 Study of let-off mechanisms.
13 Practice of erection and setting of 5 and 7 wheel take-up mechanisms.
14 Study of weft fork and weft replenishment mechanisms in shuttle looms
15 Study of warp protector mechanism.
16 Creation of designs suitable for saree borders and dhoti borders using handloom dobbyies.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Predict slub catcher and tensioner settings for various linear density and calculate production in cone winding.
CO2 Estimate and calculate production in pirn winding and warping machines
CO3 Create fabric samples for various basic weaves on handloom using 5 to 8 shafts.
CO4 Show and practice dismantling, assembling and setting of various primary, secondary and auxiliary motions in power loom.
CO5 Develop sample for saree and dhoti borders using handloom dobby

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HTPC 215 : CHEMICAL PROCESSING OF TEXTILES LAB - II

	L	T	P	C
COURSE OBJECTIVES	0	0	4	2

To enable the students to

1 perform dyeing of polyester,
2 perform direct, discharge and resist style of printing
3 perform Identification of dyes in powder and dyed material
4 perform Stiffening and softening finish
5 Understand the computer colour matching process.

List of Experiments

1 Dyeing of polyester with disperse dyes.
2 Printing of Cotton in direct style with Direct & Reactive dyes using Blocks & Screens.
3 Printing of Polyester in direct style with Disperse dyes using Blocks & Screens.
4 Printing of Cotton & Polyester in direct style with Pigment Colours using Blocks & Screens.
5 Printing of Cotton in White Discharge Style on Direct & Reactive dye using Blocks & Screens.
6 Tie & Dye style of printing
7 Batik style of printing.

8 Identification of dyes in powder form.
9 Identification of dyes in dyed material
10 Application of stiffening agent.
11 Application of Reactive / Silicone Softeners
12 Demonstration on Computer Colour Matching.
13 Calibration, K/S Data generation & Evaluation of whiteness index.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Conduct dyeing of polyester using disperse dye for the given shade with appropriate recipe.
CO2 Conduct direct, discharge and resist style of printing using blocks and screen on cotton material.
CO3 Identify dyes in powder form and in dyed materials.
CO4 Apply stiffening and softening finish on cotton
CO5 Analyse the shade using computer colour matching

-

HTPC216 : TEXTILE TESTING LAB – I

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

To enable the students to learn about

1 Moisture in substrate /textile material and its measurement.
2 Determination of fibre length, fineness, maturity and trash properties
3 Determination of yarn count and twist.
4 Testing yarn evenness, imperfections and classification of yarn faults
5 Determination of tensile strength of yarn

List of Experiments

1 Determination of Moisture Regain and Moisture Content of the given material by drying and weighing method.
2 Determination of Atmospheric Conditions in the Testing Lab (Relative Humidity and Temperature) by Wet and Dry Bulb Hygrometer.
3 Determination of effective length, mean length, dispersion percentage and short fibre percentage for the given cotton sample using Baer Sorter
4 Determination of fineness of given cotton sample by Airflow method
5 Determination of maturity value of given cotton sample
6 Determination of yarn count by Length and Weight method.
7 Determination of yarn count by Knowles Balance
8 Determination of yarn count from the given fabric swatch by using Beasley's Balance
9 Determination of yarn count by Quadrant Balance
10 Determination of twist per inch in the given sample of yarn using twist

contraction method (Untwist – Twist)

11 Determination of twist per inch in the given sample of yarn using Straightened Fibre Method.

12 Visual assessment of yarn evenness using ASTM Black Boards

13 Determination of single yarn and lea strength of yarn

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Determine moisture content in fibre and humidity.

CO2 Assess fibre length, fineness and maturity

CO3 Determine yarn count and twist.

CO4 Analyse yarn evenness, imperfections and classify of yarn faults

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AU202 ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

L	T	P	C
2	0	0	0

COURSE OBJECTIVES

1. Basic structure of Indian Knowledge System
2. Modern Science and Indian Knowledge System
3. Yoga and Holistic Health Care
4. Indian Artistic Tradition
5. Case Studies

Unit-I BASIC STRUCTURE OF INDIAN KNOWLEDGE SYSTEM

Introduction to traditional knowledge- define traditional knowledge, nature and characteristics, scope and importance; Kinds of traditional knowledge (Unani/Siddha/Ayurveda); Indian Philosophy's- Vedas, Up Vedas. Vendange: Traditional Knowledge vs Western Knowledge:

Unit -IV MODERN SCIENCE AND INDIAN KNOWLEDGE SYSTEM

Traditional knowledge and engineering: Traditional medicine system; Traditional knowledge and biotechnology, Traditional knowledge in agriculture; Traditional societies depend on it for their food and healthcare needs; Importance of conservation and sustainable development of environment; Management of biodiversity; Food security of the country and protection of knowledge.

Unit -III YOGA AND HOLISTIC HEALTH CARE

Yoga- Etymology, definitions, aim, objectives and misconceptions, Its origin, history and development: Yoga and It's Practice-Branches of yoga, Meditation and Concentration-Meditation, Introduction, definition; Types of Meditation Yoga Therapy: Meaning and Definition, Principles and Discipline, Area and Limitation, Role Of Lifestyle and Diet In Yoga Therapy, Yoga for Health, Panchkosha; Hypertension, Heart Disease, Vision Defects, Insomnia, Headache, Mental Stress, Depression, Anxiety

Unit -IV INDIAN ARTISTIC TRADITION

Painting-Ancient Paintings (Art Works, Artists, Canvas), Modern Paintings (Art Works, Artists, Canvas); Sculpture-Traditional Sculptures, Modern Sculptures; Poetry: Music; Dance- Different Types of dance forms present in traditional and modern times; Literature Traditional Literature Works (Authors, Work presented), Modern Literature Works (Authors, Work presented); Arts in Architecture- Feng Shul, Different types of monuments in North India and South India, their direction, representation, built era.

Unit -V CASE STUDIES

Traditional knowledge in Engineering: Traditional knowledge in handicrafts and handlooms: Traditional knowledge in Literature; Traditional knowledge in modern medicine

COURSE OUTCOMES

1. Identify the concept of Traditional Knowledge and its importance
2. The need of Traditional Knowledge in science and importance of protecting it
3. Illustrate the various enactments regarding Yoga
4. Importance of Indian artistic knowledge
5. Concepts of Traditional Knowledge through case study

TEXTBOOKS

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan
4. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata
5. R. Nagaswamy, Foundations of Indian Art, Tamil Arts Academy,2002

REFERENCE BOOK

1. Traditional Knowledge in Modern India-Preservation, Promotion, Ethical Access and Benefit sharing Mechnalsms by Nirmal Sengupta
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino
3. V. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya Bhavan, Mumbai. SthEdition,2014
4. Swami Jitatman and Modern Physics and Vedant, Bharatiya Vidya Bhavan
5. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987

SEMESTER V

HTPC301 : WEAVING TECHNOLOGY – II

COURSE OBJECTIVES

L	T	P	C
3	0	0	3

To facilitate the students to learn about the

1. Working mechanism of various jacquard looms and harness building.
2. Working principle of projectile and rapier looms.
3. Different jet loom and its working mechanisms.
4. Fabric parameters such as warp, weft and cloth cover factor, warp and weft yarn weight in linear meter and related calculations

Unit 1 JACQUARDS 9

Functions of Jacquard - Types of Jacquard - Jacquard mechanism - Figuring capacities of Jacquards - Types of sheds in Jacquard Shedding - SLSC Jacquard - DLSC Jacquard - DLDC Jacquard - Open shed Jacquards - Harness building - Harness Ties - Casting out - Card cutting - Card Lacing - High speed Jacquard – Introduction to electronic Jacquard - Special Jacquard mechanisms.

Unit 2 SHUTTLELESS WEAVING MACHINES 9

Techno economics of Shuttleless loom weft insertion systems; Importance of Shuttleless weaving, Installation of Shuttleless weaving machine - Minimum down time Supply Package - Accumulator - Measuring system - Cutters and automation in Shuttleless loom, selvedge in Shuttleless loom, Quick style change. Projectile looms - Basics - Weft insertion - Picking mechanism - Beat up mechanism - Rapier Loom - Classifications of Rapier weaving machines - Driving systems - Rapier Heads.

Unit 3 JET LOOMS 9

Air Jet loom - Weft Insertion - Basic requirements - Merit and demerit - Water Jet loom - weft Insertion - Basic requirements - Merit and demerit - Multiphase looms - Various methods - Circular weaving. Loom monitoring and control Loom stoppages and efficiency; fabric defects and value loss; Filament weaving – Silk & Texturised yarns.

Unit 4 YARN AND FABRIC CALCULATIONS 9

Pierce’s formula for estimation of diameter of yarns; relative diameter of yarns; calculation of cloth cover – warp cover, weft cover and cloth cover, derivation and calculations, fractional cover, percentage cover and cover factor.

Unit 5 FABRIC CALCULATIONS 9

Determination of Ends per inch and Picks per inch while changing count, weave and both to maintain the same level compactness. Determination of count of Warp &

Weft and Ends per inch and Picks per inch while increasing or decreasing the weight of fabric to maintain same level of compactness, Cloth calculation - Amount of Warp and Weft weight per linear meter, weight per square meter using Direct, Indirect and Universal systems of yarn count.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Discuss the features of jacquard loom and its types.

CO2 Explain the function of each element in projectile and rapier weaving machine.

CO3 Summarise the working principle and weft insertion cycle of jet looms.

CO4 Estimate the yarn diameter and cover factor of fabric sample.

CO5 Analyse the fabric in-terms of warp and weft threads per unit length, weight per unit area and related calculations

TEXT BOOK

1 Marks R. and Robinson T.C., “Principles of Weaving”, The Textile Institute, Manchester, 1989.

2 Sabit Adanur, “Handbook of Weaving”, Technomic Publishing Co. Inc., 2001

3 Ormerod A. and Sondhelm W.S., “Weaving: Technology and operations”, Textile Institute, 1995.

REFERENCE BOOK

1 Talukdar M.K., Sriramulu P.K. and Ajgaonkar D.B., “Weaving: Machines, Mechanisms, Management”, Mahajan Publishers, Ahmedabad, 1998

2 “Weaving: The knowledge in Technology”, Papers Presented at the Textile Institute WeavingConference, Textile Institute, 1998.

3 Booth J.E., “Textile Mathematics Volume 3”, The Textile Institute, Manchester, 1977.

4 Lord P.R. and Mohamed M.H., “Weaving: Conversion of Yarn to Fabric”, Merrow, 1992.

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HTPC212 TEXTILE TESTING – II

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to learn about

1 Construction characteristics of fabrics

2 Determination of tensile, tear and bursting strength of fabric

3 The principle and measurement of comfort and surface characteristics of fabric

4 The standards and assessment procedure for fastness testing

5 Fabric inspection and quality assessment of garments

Unit 1 CONSTRUCTION CHARECTERISTICS 9

Basic fabric particulars – Measurement of ends and picks per inch, count of warp and weft, determination of the type of weave, measurement of length, width, thickness and Area density (GSM);warp and weft crimp measurements for spun and filament yarn fabrics, the cover factor calculations; Fabric sampling techniques.

Unit 2 FABRIC STRENGTH RELATED PROPERTIES 9

Tensile strength measurement – ravelled strip test and grab test – mechanical and electronic measuring systems. Tear strength – importance – measuring systems. Bursting strength and its measurement. Ballistic impact strength. Universal tensile tester - principle and operation

Unit 3 COMFORT AND SURFACE CHARACTERISTICS 9

Fabric stiffness – principle of measurement of flexural rigidity; Drapeability – measurement of drape coefficient; Crease recovery measurement techniques. Wrinkle recovery assessment using standard grades; Principle and functioning of air permeability testers, water repellency, fabric shrinkage testing; Fabric abrasion resistance – measuring technique; Fabric pilling resistance – methods of determination.

Unit 4 FASTNESS PROPERTIES OF TEXTILES 9

Objectives of various fastness testing of textile materials. Various standards and procedure to assess washing fastness, rubbing fastness, light fastness and perspiration fastness property of a textile material.

Unit 5 FABRIC INSPECTION AND GARMENT QUALITY EVALUATION 9

Fabric inspection – Manual, semi-automatic and Automatic Inspection systems, and classification of fabric defects, Method of Grading– 4 point system and 10 point system. Acceptable quality level (AQL), MIL standards and final inspection. Quality assessment of Garments - cutting, sewing, pressing, finishing and packaging defects.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain various constructional characteristics of a fabric
CO2 Determine fabric tensile characteristics of a fabric
CO3 Assess the comfort and surface characteristics of fabric
CO4 Explain the fastness characteristics of a textile material
CO5 Explain the fabric inspection and garment quality evaluation methods

TEXT BOOK

1 Booth J.E., “Principle of Textile Testing”, Butterworth Publications, London, 1989

2 Saville B.P., “Physical Testing of Textiles”, Textile Institute, Manchester, 1998
3 Kothari V. K., “Testing and Quality Management”, Progress in Textile Technology Vol.1, IAFL Publications, New Delhi, 1999
4 Amutha, K. , A Practical Guide to Textile Testing, CRC Press, (2016).

REFERENCE BOOK

1 Dolez, P. I., Vermeersch, O., & Izquierdo, V. (Eds.),Advanced characterization and testing of textiles. Woodhead Publishing, (2017). Ruth Clock and Grace Kunz., “Apparel Manufacture – Sewn Product Analysis”, Upper Sadle River Publications, New York, 2000
2 Pradip V. Mehta., “Managing Quality in the Apparel Industry”, NIFT Publication, India, 1998
3 Sara J. Kadolph., “Quality Assurance for Textiles and Apparels”, Fair child Publications, New York,1998
4 Slater K., “Physical Testing and Quality Control”, The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993
5 Textile testing web course content https://nptel.ac.in/courses/116/102/116102029/#

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HTPC 304 : JACQUARD WEAVING AND COMPUTER AIDED TEXTILE DESIGNING LAB

	L	T	P	C
COURSE OBJECTIVES	2	1	0	3

To impart knowledge to students on

1 Development of graph for simple and compound fabric structures and designs
2 Computer Aided Textile designing using different software
3 Card Punching procedure for Jacquards

List of Experiments

1 Design development on graph paper and card punching procedures for production of figured single cloth.
2 Design development on graph paper and card punching procedures for production of damask fabrics.
3 Design development on graph paper and card punching procedures for production of figured double cloth with 2 colour and 4 colour effects.
4 Design development on graph paper and card punching procedures for production of figured warp/weft backed cloth.
5 Design development on graph paper and card - punching procedures for production of figured extra warp and extra weft fabrics.
6 Design development on graph paper and card and punching procedures for production of figured terry structures.

7 Study of figured pique structures, graph design development and card cutting procedures for these structures.
8 Study of patent satin structures, graph design development and card punching procedures for these structures.
9 Study of tapestry structures, graph design development and card cutting procedures for these structures.
10 Creation of design using paint shop pro /Adobe Photoshop /Corel draw
11 Conversation of vector image into Raster image.
12 Creation of dobby designs using CATD software.
13 Creation of Jacquard designs using CATD software.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Develop graphical design for simple and compound fabrics
CO2 Develop Textile designs by using designing software
CO3 Modify vector image to raster image using designing software
CO4 Create dobby and jacquard designs by using CATD software

-

HTPC 305 : TEXTILE TESTING LAB - II

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

To enable the students to learn about

1 The Determination of crimp, shrinkage and GSM of fabric
2 The Determination of fastness properties of dyed textile materials
3 Determination of tensile, ballistic and bursting strength of fabric
4 Determination of crease recovery, stiffness and drape characteristics of fabric
5 Determination of pilling and abrasion resistance characteristics of fabric

List of Experiments

1 Determination of warp and weft yarn Crimp in the given fabric swatch.
2 Determination of shrinkage in the given fabric swatch
3 Determination of thickness and weight of given fabric sample in terms of weight / square yard and GSM.
4 Determination of Washing fastness of dyed material by following ISO and AATCC standards
5 Determination of Wet & Dry Rubbing fastness of dyed material using Crock meter.
6 Determination of Light fastness of dyed material
7 Determination of Ballistic Strength of the given fabric
8 Determination of Tensile Strength of the given fabric
9 Determination of Fabric Tearing Strength using Elmendorf Tear Tester
10 Determination of Crease recovery of the given fabric

11 Determination of Bursting strength testing of the given fabric
12 Assessment of Pilling characteristics of the given fabric
13 Determination of bending length of the given fabric using Shirley Stiffness Tester and Assessment of Drapeability of the given fabric
14 Assessment of Abrasion resistance of fabrics using Martindale Abrasion Tester

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Determine the crimp, shrinkage and GSM of the fabric
CO2 Assess the quality of fabrics in terms of fastness properties
CO3 Analyse tensile, ballistic and bursting strength of fabric
CO4 Determine crease recovery, stiffness and drape characteristics of fabric
CO5 Analyse pilling and abrasion resistance characteristics of fabric

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SEMESTER VI

HS303 ENTREPRENEURSHIP AND START-UPS

	L	T	P	C
COURSE OBJECTIVES	3	1	0	4

1 Acquiring Entrepreneurial spirit and resourcefulness.
2 Familiarization with various uses of human resource for earning dignified means of living.
3 Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individual and the nation.
4 Acquiring entrepreneurial quality, competency, and motivation.
5 Learning the process and skills of creation and management of entrepreneurial venture.

Unit 1 INTRODUCTION TO ENTREPRENEURSHIP AND START – UPS

- Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation
- Types of Business Structures, Similarities/differences between entrepreneurs and managers
  Government Schemes for Textile Entrepreneurs
- Handloom Promotion programs, schemes available MSME, NABCONS, Textile Clusters successful entrepreneur and expos, producer companies, GEM on boarding, craft village and Design Resource Centres

Unit 2 BUSINESS IDEAS AND THEIR IMPLEMENTATION

- Discovering ideas and visualizing the business

- Activity map
- Business Plan
-

Unit 3 IDEA TO START-UP

- Market Analysis – Identifying the target market,
- Competition evaluation and Strategy Development,
- Marketing and accounting,
- Risk analysis

Unit 4 MANAGEMENT

- Company's Organization Structure,
- Recruitment and management of talent.
- Financial organization and management

Unit 5 FINANCING AND PROTECTION OF IDEAS

- Financing methods available for start-ups in India
- Communication of Ideas to potential investors – Investor Pitch
- Patenting and Licenses

Unit 6

Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain the dynamic role of entrepreneurship and small business
CO2 Discuss the role of Government schemes for entrepreneurship
CO3 Financial Planning and Control
CO4 Forms of Ownership for Small Business
CO5 Strategic Marketing Planning
CO6 New Product or Service Development
CO7 Business Plan Creation

REFERENCE BOOK

1 Steve Blank and Bob Dorf, The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company, K & S Ranch ISBN – 978-0984999392
2 Eric Ries, The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Penguin UK ISBN – 978-0670921607
3 Adrian J. Slywotzky with Karl Weber, Demand: Creating What People Love Before They Know They Want It, Headline Book Publishing ISBN – 978-0755388974
4 Clayton M. Christensen, The Innovator's Dilemma: The Revolutionary Book

That Will Change the Way You Do Business, Harvard business ISBN: 978-142219602
5 https://www.fundable.com/learn/resources/guides/startup
6 https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate structure/
7 https://www.finder.com/small-business-finance-tips
8 https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

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HTPC306 : FABRIC ANALYSIS AND COSTING LAB -II

L	T	P	C
2	1	0	3

COURSE OBJECTIVES

To enable the students to learn about

1 Analysis of cloth particulars and weave
2 Factors involved in fabric costing

List of Experiments

1 Analysis of weave, constructional details, weaving techniques and costing of at least two traditional handloom sarees
2 Extracting the production particulars of given plain fabric sample and furnishing the production and cost details.
3 Extracting the production particulars of given handloom multi treadle design fabric sample and furnishing the production and cost detail
4 Extracting the production particulars of given handloom extra warp and weft sample and furnishing the production and cost detail
5 Extracting the production particulars of given double cloth sample and furnishing the production and cost detail
6 Extracting the production particulars of given handloom jacquard design fabrics and furnishing the production and cost detail

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Analyse and extract the construction particulars of woven fabric sample for reproduction
CO2 Estimate the cost of fabric.

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HTPC307: HANDICRAFT TEXTILES & HANDLOOM TOURISM OF INDIA

L	T	P	C
3	0	0	3

To be framed.

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PROGRAMME ELECTIVES

HTPE201 : TEXTILE COSTING

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable to learn about

1. Elements of cost accounting
2. Costing of yarns and fabrics in spinning and weaving mills
3. Wet process cost
4. Costing of apparels in a garment unit
5. Working capital management

Unit 1 ELEMENTS OF COST ACCOUNTING 9

Introduction to cost accounting, - Cost ledgers: Reconciliation between cost and financial accounting, costing methods, Product Costing, Job, order, Batch, Contract costing and Cost Sheet.

Elements of cost & classification of cost elements – examples from spinning and weaving mill; standard costing, analysis of variance; breakeven analysis, cost volume profit analysis

Unit 2 YARN AND WET PROCESS COST 9

Costing of yarn – material, labor, power and overhead expenses; allocation of costs to yarns in spinning mill running with different counts- balancing of machinery.

Unit 3 FABRIC COSTING 9

Woven Fabric costing: Yarn cost, warp weight, Weft weight, preparation charge cost, Sizing cost, Warping cost, weaving cost, other cost, miscellanies cost, profit & cost sheet.

Knitting Fabric Costing: Yarn cost, knitting cost, post knitting charge, miscellanies cost, profit & cost sheet.

Unit 4 GARMENT COSTING 9

Fabric and accessories Cost Estimation at Garment Factory for cutting, stitching, checking, packing, forwarding, shipping, insurance etc.

Unit 5 WORKING CAPITAL MANAGEMENT 9

Project cost- Working capital management in spinning, weaving and chemical processing unit – determination, sources, cost; Budget, types of budgets, budgeting and control in textile unit.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Summarize broadly about Costing, accounting elements of cost in textile industries

CO2 Compare the process costs for yarn &and wet processing of textiles
CO3 Estimate the cost of Woven and knitted fabrics
CO4 Decide the cost of various garment products
CO5 Justify the concept of working capital management and execute financial planning of various textile sectors and profitability to achieve the organization goal.

TEXT BOOK

1 Johnson Maurice, E. Moore, “Apparel Product Development”, Om Book Service, 2001.
2 Katherin McKelvy, “Fashion Source Book”, Om Book Service, 2001.
3 M. Krishna Kumar, Apparel Costing, Publisher: Abhishek Publications, 2015
4 Hardman Arthur H, Productive Costs in Cotton Spinning Mills, Publisher: Nabu Press, October 2010.
5 Principles of Cost Accounting: Managerial Applications by Richard D Irwin Management Accounting, Sultan Chand and Sons.

REFERENCE BOOK

1 M.N.Arora, Cost Accounting: Principles and practice, New Delhi: Vikas publishing Pvt. Ltd., 2011.
2 Horngreen, Foster &Datar,Cost Accounting-A Managerial Emphasis, New Delhi: Prentice Hall India, 2010.
3 Dr. Ashish K. Bhattacharyya, Principles and Pracitice of Cost Accounting, NewDelhi: Prentice Hall (PHI), 201
4 I.M.Pandey,Financial Management, New Delhi: Vikas Publishing House Pvt. Ltd.,2012
5 Brigham and Houston, Fundamentals of Financial Management, New Delhi: Thomson Learning,
6 Prasanna Chandra, Financial Management-Theory and Practice, New Delhi: Tata McGraw- Hill Publishing Company Ltd, 2012
7 Aswat Damodaran., “Corporate Finance Theory and Practice”, John Wiley & Sons, 2001,
8 James C., Van Home., “Financial Management and Policy”, 12th Edition Prentice Hall of India Pvt. Ltd., New Delhi, 2001
9 Thukaram Rao M.E., “Cost and Management Accounting” New Age International, Bangalore, 2004.
10 Khan., and Jain, “Basic financial Management & Practice”, 7th Edition, Tata McGraw Hill, New Delhi, 2014.

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HTPE 202 : GARMENT MANUFACTURING TECHNOLOGY

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To impart knowledge to students on

1 Basics of garment making process like spreading

2 Garment components

Unit 1 INTRODUCTION AND CLASSIFICATION 9

Introduction to Apparel Industry: Apparel industry in India - Domestic industry: Various departments in the Garment industry; Classification of garments; Type of fabric – season – events – application – manufacturing – sources – gender and age – style and shape – length of the garment. Process flow chart for the production of basic garments.

Unit 2 MEASUREMENTS AND PATTERN MAKING 9

Anthropometry – 8 head theory - The sequence of taking body measurements. Concepts of basic pattern making - types of pattern making - principles for pattern drafting with examples – pattern making tools and its applications - concepts of pattern grading.

Unit 3 SPREADING AND CUTTING 9

Introduction to fabric spreading, marker planning and marker efficiency. Types and functions of cutting machines – straight knife, round knife and band knife cutting machines. Introduction to computerised cutting machines. Common defects in spreading, cutting and their remedies.

Unit 4 SEAMS, STITCHES, ACCESSORIES AND TRIMS 9

Types of Stitches and Federal classifications - Types of seams and Federal classifications. Defects in stitches and seams. Basic parts of sewing machines and their functions. Sewing thread – construction, material, thread size and packages. Introduction to Trims and accessories – Labels, linings, interlinings, waddings, lace, braids, elastics, shoulder pads, Fastener - hook and loop (Velcro), Hook and eye, button and Zip

Unit 5 SEWING MACHINES 9

Basic parts of sewing machines and their functions. Classification of the sewing machine and its applications: Single Needle Lock Stitch Machines (SNLS), Double Needle Lock Stitch Machines (DNLS), Overlock and Flatlock. Sewing machine bed types and their applications. Introduction to Sewing Needles, its types, size and their application. Introduction to different special-purpose sewing machines: Feed of arm, button hole sewing, button sewing, Bartack, blind stitch machines and embroidery sewing machines. Fusing and Pressing.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain domestic apparel industry and classification of garments.

CO2 Apply standard measurements for garments and concepts of pattern making.
CO3 Discuss about spreading, marker planning and cutting operations in garment industry
CO4 Describe different types of seams, stitches, Trims and accessories used in garment construction
CO5 Identify various sewing machines used for different processes of garment manufacturing

TEXT BOOK

1 T P Karthik, T Ganesan & D Gopala Krishnan, AMT, CRC press.
2 Jacob Solinger, Apparel Manufacturing Handbook, Van Nostrand Reinhold Company, 1980
3 Harold Carr& Barbara latham, The Technology of Clothing Manufacture, Black well Sciences, 1996

REFERENCE BOOK

1 Ruth E. Glock & Grace I. Kunz, Apparel Manufacturing Sewn Product Analysis, Pearson Prentice Hall, 2005
2 Shaeffer Claire, “Sewing for the Apparel Industry”, Prentice-Hall, New Jersey, 2001
3 Mary Mathews, “ Practical Clothing Construction” Part I & II, Cosmic Press, Madras
4 Gerry Cooklin, Garment Technology for Fashion Designers, Blackwell Science Ltd, 2001
5 Zarapkar, System of Cutting, Bombay publications, 2006

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HTPE203: NONWOVEN TECHNOLOGY

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to learn about the

- Concepts of nonwovens, fibre preparation and characteristics
- Different techniques involved in web formation
- Various web bonding processes
- Polymer-extrusion based technologies for nonwovens manufacture
- Testing of nonwoven fabrics and applications

Unit 1 FUNDAMENTALS OF NONWOVEN FABRICS 9

Introduction to nonwovens – Definitions and classification of nonwovens-fibre preparations and their characteristics for the production of nonwovens and Applications of nonwovens methods of nonwoven fabric production.

Unit 2 WEB FORMATION WITH STAPLE FIBRES 9

Production of staple fiber web: Dry laid – card, air; wet laid; web layering

techniques – parallel, cross and perpendicular. Influence of web laying methods on fabric properties; quality control of web.

Unit 3 MECHANICAL, CHEMICAL AND THERMAL BONDING 9

Web Bonding Processes: mechanical bonding-needling, stitching, water jet consolidation; Thermal Bonding technologies; Chemical bonding–Binder polymers and bonding technologies

Unit 4 POLYMER– LAID WE BAND FABRIC FORMATION 9

Polymer-extrusion based technologies - Manufacture of Spun bonded fabrics; Manufacture of Melt blown fabrics – fibre formation and its attenuation; Effect of processing parameters on fabric characteristics

Unit 5 FINISHING AND TESTING OF NONWOVENS 9

Introduction – Mechanical and chemical finishing of nonwoven; Testing – standards for nonwovens; Stages of testing – fibre preparation and nonwovens stages; testing based on applications

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Classify nonwovens and explain the basics of fibre preparation and fabric manufacturing methods for nonwovens

CO2 Describe different web forming techniques for nonwovens manufacturing

CO3 Summarize and compare different bonding methods used in nonwovens manufacturing

CO4 Explain polymer laid web formation techniques and manufacture of spun bonded and melt blown fabrics

CO5 Evaluate the performance of nonwovens from fibre preparation to nonwoven manufacturing stages with different standards.

TEXT BOOK

1 Lunenschloss J., Albrecht W.and David Sharp., “Nonwoven Bonded Fabrics”, Ellis Horwood Ltd., New York,1985.

2 Nonwovens: Process, structure, properties and applications, by T.Karthik, R.Rathinamoorthy, C. Praba Karan, Woodhead Publishing India Pvt Ltd. New Delhi.

3 Russell S.,“Hand Book of Nonwovens”, Textile Institute, Manchester,2004.

4 Chapman R.,“Applications of Nonwovens in Technical Textiles”, Textile Institute, Manchester,2010.

REFERENCE BOOK

1 Mrstina V. and FeigF., “Needle Punching Textile Technology”, Elsevier, New York, 1990.

2 Dharmadhikary R. K., Gilmore T. F., Davis H. A. and Batra S. K., “Thermal Bonding of Nonwoven Fabrics”, Textile Progress,Vol.26,No.2,Textile

Institute Manchester, 1995.

3 JirsakO.and WadsworthL. C., “Nonwoven Textiles”, Textile Institute, Manchester,1999.

4 https://nptel.ac.in/courses/116/102/116102014/ NPTEL on NonWoven Technology

5 O. Irsak, Nonwoven Textiles, Textile Institute, Manchester, 1999

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HTPE301 : KNITTING TECHNOLOGY

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

- To enable the students to know about fundamentals of weft and warp knitting and classifications of knitted fabrics
- To enable the students to know about the fabric structures and their derivatives
- To illustrate the students about the mechanism of loop formation in weft and warp knitting.

Unit 1 INTRODUCTION TO KNITTING 9

Introduction to knitting; Comparison of fabric properties - woven, knits and nonwoven fabrics; classification of knitting processes – weft knit & warp knit; yarn quality requirements for knitting. Preparation of staple yarns for weft and warp knitting. Basic terminologies such as course, wales, technical face, technical back, course length, stitch length, WPI, CPI, stitch density, GSM, Tightness Factor etc.,

Unit 2 FUNDAMENTALS OF KNITTING 9

Needles – types, merits and demerits, Loop forming sequence of latch, bearded & compound needles. Passage of material through weft knitting machines. Functional Elements: Sinkers, Cylinder, Dial, Cams, Creels, Feeder, Fabric Spreader, Take down and winding Mechanism. Elements of knitted loop structures.

Unit 3 WEFT KNIT STRUCTURES 9

Basic weft knitted structures, production and properties - plain, rib, interlock and purl; Line, Symbolic and diagrammatic notations of basic weft knitted structures, Factors affecting the formation of loop; effect of loop length and shape on fabric properties; Fundamentals of formation of knit, tuck and float stitches

Unit 4 FLAT KNITTING AND DERIVATIVES 9

Basic principles and elements of flat knitting machines; different types of flat knitting machines - manual, mechanical and computer controlled; production of various weft knitted structures using flat knitting machines

Unit 5 WARP KNITTED STRUCTURES 9

Basic principles; elements of warp knitted loop – open loop, closed loop; warp knitting elements chain link, chain links for simple patterns, guide bar movement

mechanism. Tricot and Rachel warp knitting machines. Let-off system; take-up system; Uses of warp knitted fabrics in technical applications

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain the basic knitting terminology, specifications and functions of weft knitting machines

CO2 Explain the sequence of loop formation, passage of material and role of functional elements of knitting

CO3 Identify different structures of the basic weft knitted structures

CO4 Explain the basic terminology in flat ~~warp~~ knitting, specifications and functions of flat knitting machines

CO5 Demonstrate the loop formation in warp knitting

TEXT BOOK

1 Anbumani N., Knitting-Fundamentals, Machines, Structures and Developments, New Age International Publishers, 2007.

2 Ray, S. C. (Ed.). Fundamentals and advances in knitting technology. CRC Press. 2012.

REFERENCE BOOK

1 Henry Johnson, Introduction to Knitting Technology, Abhishek Publications, Chandigarh, 2006.

2 Ajgaonkar D.B., Knitted Technology, Universal Publishing Corporation, Mumbai, 1998.

3 Spencer D.J., Knitting Technology: A Comprehensive Handbook, Woodhead Publishing Limited, England, 3rd Edition, 2001.

4 Maity, S., et. al., (Ed.). Advanced Knitting Technology, Woodhead Publishing, UK. 2021

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HTPE302 : ADVANCED FABRIC STRUCTURE

COURSE OBJECTIVES

L	T	P	C
3	0	0	3

To impart knowledge to student on

1 Graph preparation for Jacquard looms,

2 Card punching procedure for figured fabric

3 Types of harness building and construction of harness

Unit 1 JACQUARD CARD PUNCHING AND EXTRA WARP AND WEFT DESIGNS 9

Study of the jacquard graph development and card punching technique for straight tie-straight draft, straight tie- sectional draft, sectional tie- sectional draft arrangements. Introduction of traditional loom mountings- heald and harness mountings, Pressure harness, Bannister harness, working comber boards in various designs. Damask – Salient features – Structure of cloth – Designing, enlargement and punching techniques for jacquards. Figured extra warp and extra weft designs

using jacquard and jacquard with healds.

Unit 2 FIGURED PATENT SATIN AND PIQUES 9

Figured Patent satin – structure of cloth – Use of straight tie with healds- use of working comber for saving of punched cards-Designing, simplified enlargement and punching technique. Figured piques – Structure of cloth – Use of Straight tie with healds – use of working comber board in fast back structures to save punched cards-designing and Simplified enlargement technique.

Unit 3 FIGURED BACKED CLOTH 9

Figured warp backed cloth – Structure of cloth – Use of sectional harness in simplification of graph development process and punching technique. Figured weft backed cloth – Structure of cloth – Separation of two series of weft for simplifying graph development process and punching technique. Tapestry – Traditional and modern Tapestries – Simple weft faced tapestries; two coloured weft faced reversible structures; three colour and four colour weft faced reversible and non-reversible structures. Modern Tapestry–3 pick & 4 picks tapestry using jacquard and heald method. Designing, simplified enlargement and punching techniques

Unit 4 FIGURED DOUBLE CLOTH AND TERRY 9

Study on Figured double cloth and Figured Terry (3 and 4 pick terry weave) –Design development and punching process for straight harnessing with straight draft , straight harnessing with sectional draft ,sectional harnessing with sectional draft – Structure of cloth.

Unit 5 GAUZE AND FIGURED LENO 9

Figured Leno and gauze fabrics – Salient features-Bottom douping and top douping. Stripe and Check effect; plain, twill and leno combination; Cord effect, Net leno. Indication of leno structures, drafting plan and lifting plan of straight and pointed draft structures. Chenille Axminister pile fabrics manufactured using handlooms - technique of fabric manufacture and designing

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Develop the figured single cloth design and understand the working of traditional handloom mountings.

CO2 Construct weave, draft, peg-plan for the production of figured Patent satin and piques

CO3 Describe Figured warp backed cloth, figured weft backed cloth and Tapestry fabrics

CO4 Develop the figured double cloth and Terry fabric

CO5 Construct gauze and figured Leno fabrics

TEXT BOOK

1 Grosicki Z. J., “Watson’s Textile Design and Colour”, Vol.1, Woodhead Publications, Cambridge England, 2004
2 Grosicki Z. J., “Watson’s Advanced Textile Design and Colour”, Vol.II, Butterworths, London, 1989..
3 Grammar of Textile Design by H. NISBET, F.T.I.

REFERENCE BOOK

1 Georgmar D. Woven Structure and Design Part I Single Cloth Construction WIRA UK 1986
2 Georner D, “Woven Structure and Design, Part 2: Compound Structures”, WIRA,U.K., 1989.
3 X. Chen,M. Spola,J. Gisbert Paya &P. Mollst Sellabona1,Experimental Studies on the Structure and Mechanical Properties of Multi-layer and Angle-interlock Woven Structures, Pages 91-99

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HTPE 303 : FASHION DESIGNING

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

1 To enable the students know about the basics of fashion terms, fashion cycle and fashion designing
2 To elaborate the students about the colour theory and principles of design.
3 To teach the students about the design and portfolio development.

Unit 1 9

Definition and origin - terms & definitions - reasons for change in fashion - classification of fashion – Style, classic, FAD, Trend - fashion cycle. Fashion designing - designers‟ role in styling and production of costumes.

Unit 2 9

Design aesthetics – Definition, Types - Structural and decorative design. Elements of design – line, shape, form, colour & texture. Lines – varieties and their application in a design. Shapes - Types – Natural, stylized, geometrical, and abstract.

Colour – Definition and origin – Characteristics (hue, value and intensity) - Prang colour chart - color harmony and colour schemes. Psychology of colour and its application in apparel market. Texture – types of texture and its application in clothing.

Unit 3 9

Balance, proportion**,** rhythm, harmony & emphasis. Balance - asymmetrical and symmetrical. Types – Formal, Informal and radial. Proportion or scale – planning the shapes and space.

Rhythm – through repetition, alternation, progression and gradation. Emphasis using contrast colours and background. Harmony of lines, shapes, colour and

textures.

Unit 4 9

Skirts - Basic concepts in designing the variety of skirts. Trousers – Basic concepts in designing the variety of trousers. Introduction to neck lines, waistlines, hemlines, collars, sleeves, cuffs, plackets and pockets. Fullness applied in apparel –tucks, pleats, gathers, shirring, frills or ruffles, flounces.

Unit 5 9

Market research - method of fashion Trend forecast. Silhouettes – Types and their application in everyday use. Wardrobe planning –Portfolio development.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain basic fashion terminology, theories involved in fashion cycle and role of fashion designer.

CO2 Apply elements of design and color theories on clothings.

CO3 Explain various principles of design used in apparel.

CO4 Explain basic concepts in designing of various garments and its components.

CO5 Describe methods of trend forecast and develop design portfolio

TEXT BOOK

1 Parul Bhatnagar, “Traditional Indian Costumes and Textiles”, Abhishek Publications, Chandigarh,2004.

2 Elaine Stone, “The Dynamics of Fashion”, Fairchild Publications, New York, 2001.

REFERENCE BOOK

1 Peacock J., “Fashion Source Books”, Thames and Hudson, 1997-98.

2 Gini Stephen Frings, “Fashion Concept to Consumer”, Prentice Hall, New Jersey, 2004.

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HTPE304 : TECHNICAL TEXTILES

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to learn about

1 Classification of technical textiles, overview of properties of high performance fibres and applications of technical textiles

2 Requirements and manufacture of tyre cords

3 Properties and manufacture of belts and hoses

4 Textiles in filtration and protective garments

5 Various technological aspects of geo and medical textiles

Unit 1 INTRODUCTION TO TECHNICAL TEXTILES 9

Introduction: Definition – scope – milestones in the development, textile process,

applications of technical textiles - twelve sectors of technical textiles - raw materials used in technical textiles;

High performance fibres: Glass, carbon, aramid and ultra high modulus fibres – properties, structure and applications.

Unit 2 TYRECORDS AND BELTS 9

Requirements of tyrecord - suitability of various fibres - polyester and nylon tyre cords – manufacture of tyrecords. Conveyor Belts - physical and mechanical properties-construction, manufacture of conveyor belts, requirements of Seat belt and air bags

Unit 3 TEXTILES IN FILTRATION 9

Filter fabrics: Introduction**-** principles of filtration - types of filtration, Textiles in liquid filtration - Textiles in dry filtration – Dust collection theory – cleaning mechanism of filters

Unit 4 PROTECTIVE TEXTILES 9

Protective clothing**:** requirements of protective clothing. Principle, Fiber and fabric requirements for Ballistic protection, Flame resistant protective clothing. Chemical protective textiles.

Unit 5 MEDICALTEXTILES AND GEO TEXTILES 9

Medical Textiles: Introduction – Materials used in bio textiles - Classification - implantable, and non-implantable materials- sutures

Geo-textiles: Definition- functions - raw materials - woven, nonwoven and knitted Geo-textiles-Applications of geo-textiles for drainage, separation, soil reinforcement, and filtration and erosion control.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Define, classify technical textiles sectors and describe the properties and applications of high performance fibres used for technical textiles

CO2 Elucidate requirements, manufacture and properties of tyre-cord fabrics and belts

CO3 Explain the filtration mechanism and different types of filters

CO4 Illustrate the materials and properties of different protective textiles

CO5 Implement the role of textile materials in geo textiles and medical textiles product development.

TEXT BOOK

1 Handbook of Technical Textiles, Ed. A R Horrocks and S C Anand, Woodhead Publication Ltd., Cambridge (2000)

2 Handbook of technical textiles, Volume 1: Technical Textile Processes by A Richard Horrocks, Subhash C. Anand, The Textile Institute,

WoodheadPublication Ltd., Cambridge (2016).

3 Handbook of technical textiles, Volume 2: Technical Textile Applications by A Richard Horrocks, Subhash C. Anand, The Textile Institute, Wood head Publication Ltd., Cambridge (2016).

4 AdanurS., “Handbook of Industrial Textiles”, Technomic Publication, Lancaster, 2001

REFERENCE BOOK

1 Kanna M.C.,Hearle, O Hear., Design and manufacture of Textile Composites, Textile progress, Textile Institute, Manchester, April 2004.

2 Scott, Textile for production, Textile progress, Textile Institute, Manchester, Oct. 2005.

3 Shishoo,Textileinspot,Textileprogress,TextileInstitute,Manchester,Aug.2005

4 Kennady, Anand Miraftab, Rajandran, Medical Textile & Biomaterials for Health care,WoodheadpublishingLtd.,UK,2005

5 Medical Textiles-International Conference on Medical Textiles, Bolton, Woodhead Publication,Cambridge,1997 Geo textile by John, N.W.M, Blackie publication, Glasgow, 1987

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HTPE305 : APPAREL MARKETING AND MERCHANDISING

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

1 To enable the students to learn about the marketing strategies and functions in apparel merchandising.

2 To explain the students about sourcing strategies, supply chain management and time management.

3 To elaborate the students about various documents meant for apparel exports.

Unit 1 MARKETING 9

Apparel marketing: Definition, scope, functions and strategies of marketing.

Market Research: International market, retail and wholesale market and domestic market.

Advertising: Purpose, methods, types of advertising media, sales promotion methods.

Unit 2 MERCHANDISING 9

Apparel Merchandising: Definition, functions of merchandising division, roles and Responsibilities of merchandiser.

Types of Merchandising: Principles and techniques of apparel merchandising, retail merchandising, visual merchandising, interfacing merchandising with production.

Unit 3 SOURCING 9

Sourcing: Definition, need and important factors in sourcing, methods of

sourcing raw materials, sourcing of accessories, manufacturing resource planning, principles of MRP, Overseas sourcing - sourcing strategies. Supply chain and demand chain analysis, Materials management for quick response, Buying houses.

Unit 4 DOCUMENTATION 9

Order confirmation, various types of export documents, pre-shipment post-shipment documentation -terms of sale - payment - shipment

Unit 5 TIME MANAGEMENT 9

Time management in merchandising, production scheduling, route card format, accessories follow-up, practical check points, computer applications in marketing and merchandising.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Explain various types of apparel market and advertising techniques involved in merchandising.

CO2 Discuss the types and functions of merchandising.

CO3 Explain the factors involved in sourcing, supply chain and material management systems.

CO4 Classify various types of documents used for export of apparels.

CO5 Develop production scheduling and manage time in marketing and merchandising

TEXT BOOK

1 V. R. Sampath, P. Perumalraj and M. Vijayan, “Apparel Marketing and Merchandising”,Kalaiselvam Pathippakam, Coimbatore, 2007.

2 Vijay Barotia,”Marketing Management”, Mangal Deep Publication, New Delhi, 2001.

REFERENCE BOOK

1 Moore Evelyn C., “Path for Merchandising- A Step by Step Approach”, Thames and Hudson Ltd., London, 2001.

2 Jarnow J. and Dickerson K. G., “Inside the Fashion Business”, Prentice Hall, New Delhi, 1997

3 Laine Stone and Jean Samples, “Fashion Merchandising”, McGraw Hill Books, Singapore, 1985

4 Ruth E Glock, Grace I Kunz, “Apparel Manufacturing”, Sewn Product Analysis - 3rd Edition,Prentice Hall Inc., 2000

5 J. A. Jarnow, M. Guerreiro and B. Judelle, “Inside the Fashion Business”, Macmillan PublishingCompany, 1990.

6 Grace I. Kunz, “Merchandising: Theory, Principles and Practice”, Fairchild Books, 2005

7 Elaine Stone and A. Jean, “Fashion Merchandising - An Introduction”, McGraw-Hill BookCompany, 1990.

HTPE306 : ADVANCES IN TEXTILE PROCESSING

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to understand

1 The concept of biotechnology in textile processing,
2 The process of combined, continuous and blend processing.
3 Special prints and concept of digital printing
4 The advancement in finishing and garment processing
5 The concept of eco-friendly processing and effluent treatment.

Unit 1 BIO-TECHNOLOGY IN TEXTILE PROCESSING 9

Introduction – Enzymes-mechanism of enzyme action, Process conditions for activating enzymes and Factors affecting efficiency of enzyme treatment. Pretreatments – Enzymatic desizing, enzymatic degumming, enzyme scouring, enzymatic bleaching. Finishing − Bio-finishing and Use of enzymes in Denim washing .Merits and Demerits of enzyme processing.

Unit 2 COMBINED, CONTINUOUS AND BLENDS PROCESSING 9

Introduction, combined scouring and desizing, combined scouring and bleaching, combined desizing, scouring and bleaching. Continuous process – need, machines used.

Pretreatment and dyeing of Polyester/Wool, Polyester/Cotton and Polyester/Viscose, cotton/spandex.

Unit 3 SPECIAL PRINTS AND DIGITAL PRINTING 9

Special Printing Effects – Brasso, Kadi, Metallic, high density print, crepon style, Flock printing and Foam printing.

Digital Printing – Introduction, principle, methods, pretreatment, ink types and substrate, advantages and disadvantages.

Unit 4 FINISHING AND GARMENT PROCESSING 9

Introduction, Definition, concept and applications of nanotechnology, plasma technology, micro-encapsulation, ultrasonic, UV protection, antimicrobial finishes.

Garment processing - Introduction, factors to be considered, machineries used, advantages and disadvantages.

Unit 5 ECO-FRIENDLY PROCESSING AND EFFULUENT TREATMENT 9

Pollution in textiles-Introduction, textile pollutants, banned dyes, harmful chemicals, alternatives to banned dyes and chemicals. Characteristics of waste water, Effluent treatment – methods, design and working of ETP and tolerance level of effluent.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Describe the application of enzyme in textile wet processing.
CO2 Explain the combined processing and processing of blends.
CO3 Appraise on various special prints and concept of digital printing.
CO4 Discuss on advancement in textile finishing and garment processing.
CO5 Explain the concept of eco-friendly processing and ETP.

TEXT BOOK

1 Chemical technology in the pre-treatment processes of textiles – S.R.Karmakar, Elsever, 1999.
2 Textile Printing – R.S.Prayag.
3 Digital Printing of Textiles, Ujiie. H. Woodhead publishing,2006.
4 Technology of Dyeing – V.A.Shenai
5 Garment Finishing & Care Labelling by S.S.Satsangi, Usha Publishers, 53-B/AC-IV, Shalimar Bagh, New Delhi.

REFERENCE BOOK

1 Handbook of Textile processing machinery – R.S. Bhagwat1999.
2 Eco-friendly wet processing, NCUTE.

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HTPE 307 : TECHNOLOGICAL DEVELOPMENTS IN HANDLOOMS

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To impart knowledge to students on

1 Developments in preparatory and handloom weaving processes
2 Working principles of various elements in handlooms.

Unit 1 DEVELOPMENTS IN HANDLOOM WEAVING PREPARATORY MACHINES 9

Objectives of Technological developments in handlooms- the layout of placing the looms in systematic / organized way and its merits and demerits – Limitations of Hand operated pirn, cheese and bobbin winding charkas used in preparatory processes. Advantages of single spindle and multi spindle winding machines over hand operated charkas.

Unit 2 DEVELOPMENTS IN STRUCTURE OF HANDLOOM 9

Importance of Angle iron pillars and cross bars used in place of wooden pillars and cross bars in pit looms - Power operated in-house beaming machine for long length of warp and its advantages- Improved Frame loom and its advantages.

Unit 3 DEVELOPMENTS IN TAKE UP AND HANDLOOM DOBBIES 9

5 wheel take up motion and worm & worm wheel take up motions used in handlooms - Drop box or vibrating box attachments on handlooms - Vertical Handloom dobby - Its merits and demerits. Plunger mechanism used in Durry weaving and its advantages

Unit 4 SOLID BORDER WEAVING AND TWIN CLOTH 9

Weaving on handlooms with multiple jacquards - Solid border weaving with catch cord technique – Solid border weaving sley - Multiple butta weaving sley - Advantages and disadvantages of these mechanisms. Twin cloth weaving sley. Improved pit loom.

Unit 5 SEMI AUTOMATIC HANDLOOM AND ITS ATTACHMENTS 9

Semi-automatic looms – Nepali pedal loom, Chittaranjan loom, banaras semi-automatic loom, itchalkaranchi loom – Electric motor operated jacquard lifting mechanism, Pneumatic lifting mechanism for jacquard. Electromagnetic lifting mechanism for heald shaft – Merits and demerits of these mechanisms.

Total : 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Express various advanced preparatory processes in handloom weaving

CO2 Describe the various developments in structure of handloom

CO3 Explain various developments in take-up mechanisms and handloom dobbies

CO4 Express the solid border weaving and twin cloth

CO5 Demonstrate various handlooms and its advanced mechanisms

REFERENCE BOOK

1 Mamidipudi, Annapurna & Bijker, Wiebe. (2018). Innovation in Indian Handloom Weaving. Technology and Culture. 59. 509-545. 10.1353/tech.2018.0058.

2 http://textilescommittee.nic.in/sites/default/files/coursecontent/Dobby%20Handloom%20Weaver.pdf

3 http://textilescommittee.nic.in/sites/default/files/course-content/Dobby%20Handloom%20Weaver.pdf

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HTPE308 : TRADITIONAL HANDLOOM TEXTILES OF INDIA

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To impart knowledge to students on

1 Product specifications and production techniques of traditional handloom products
2 Organisations and Government Acts related to handlooms

Unit 1 9

Product specifications, production techniques, raw material and unique characteristics of Banaras Brocade Silk Saree, Baluchari Silk Saree, Bomkai Saree, Chanderi Saree, Chettinad Cotton Saree, Gadwal Saree, Ilkal Saree, Jamdani Cotton Saree.

Unit 2 9

Product specifications, production techniques, raw material and unique characteristics of Kota Doria Saree, Khandua Saree, Kani Pashmina Shawl, Kancheepuram Silk Saree, Maheswari Saree, Mangalgiri Saree, Paithani Saree, Pochhampally Ikat Saree, Siddipet Gollabama Saree,

Unit 3 9

Product specifications, production techniques, raw material and unique characteristics of Shantipuri Cotton Saree, Tangail Cotton Saree, Tanchoi Silk saree, Uppada Jamdani Silk Saree, Venkatgiri Cotton Saree, balaramapuram cotton saree

Unit 4 9

India Handloom Brand (IHB) - Objectives – benefits – standard operating procedure – Detailed procedure on surveillance – certificate of registered trade mark. Role of Office of DCH, Weaver's service centres and Textile Committee on IHB. Handloom mark – Objectives, details of schemes, Silk mark – Objectives, details of scheme. Introduction to Global Organic Textile standard (GOTS)

Unit 5 9

The Handloom (Reservation of articles for Production) Act, 1985; Terms and definitions. Range reserved for exclusive production by handlooms. Power to specify articles for exclusive production by handlooms. Constitution of advisory committee. Prohibition of production of articles reserved exclusive production by handlooms- power to call information, inspection, search and seize – penalty for contravention

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Describe the specifications and production techniques of traditional sarees
CO2 Explain the specifications and production techniques of shawls and sarees
CO3 Describe the unique characteristics of traditional sarees
CO4 Explain the importance of handloom certification process

CO5 Describe the Handloom reservation act and its importance

REFERENCE BOOK

1 https://www.indiahandloombrand.gov.in/
2 http://cbseacademic.nic.in/web_material/Curriculum/Vocational/2015/Traditional_India_Textile_and_Basic_Pattern_Dev_XII/CBSE_Traditional_Indian_Textiles%20_XII.pdf
3 The Handloom (Reservation of articles for Production) Act, 1985, no 22 of 1985.
4 John Gillow, Nicholas Barnard, "Traditional Indian Textiles"
5 Anjali karolia**, "Traditional Indian Handcrafted Textiles"** History, Techniques, Processes, and Designs Vol. I & II

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HTPE309 : HOME TEXTILES

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To enable the students to learn about

1 Fundamentals of home textile, materials used for home textile products and factors affecting their selection of home textile.
2 Kitchen textiles, draperies, bed linen and towels.
3 Manufacture and properties of floor coverings.
4 Care of home textiles and testing of home textile products.

Unit 1 FUNDEMENTALS OF HOME TEXTILES 9

Home Textiles: Definition, different types of home textiles, selection of fibers, Colors, Designs, factors affecting selection of home textiles, woven & Nonwoven; Upholstery: Materials - Fixed upholstery, Non-stretch loose covers, Stretch covers - Cushion covers; Table Textiles - Definitions, Different types, table mats, table cloth and hand towels, selection of material, use and care labeling; Living Room Furnishing - Sofa covers, wall hangers, cushion, cushion covers, upholsteries, bolster and bolster covers

Unit 2 KITCHEN TEXTILES AND DRAPERIES 9

Kitchen Textiles: Definition, Types- apron-dish cloth, bread bag, pot holders, hand towels, fridge cover, fridge handle covers, mixer cover, grinder covers their use and care labeling; Wall coverings- use and care labeling; Draperies and curtains- choices of fabrics, calculating the amount of material needed, hints on making curtains, hang wall; Methods of furnishing draperies at the top with tucks or pleats; Use of drapery rods, hooks, tapes, rings and pins.

Unit 3 BED LINENS AND TOWELS 9

Bed Linen -Definitions, different types of bed linens, sheets, blankets, blanket vovers, comforters, comforter covers and bed spreads; Mattress - Mattress covers, pads, pillows; Made-ups in hospitals; Textiles care labeling; Towels: Types, bath robes, bead towels, napkins; Construction of towels- weave, pile height - pattern - dyeing and finishing, Absorption tests; Velour - Types of velvet and construction.

Unit 4 FLOOR COVERINGS 9

Floor covering: hard floor coverings, resilient floor coverings, soft floor coverings, Rugs, cushions pads and care labeling; Carpet Manufacture methods & Types: Tufted, Hand tufted, Needle felt, Woven & Knotted. Wilton & Administer - Knitted, Stitch bonding and & Flocking; Carpet fibers and &yarns: Wool, wool blend, nylon, polypropylene, polyester and & acrylic

Unit 5 CARE AND TESTING OF HOME TEXTILES 9

Care of Home Textiles - Vacuum cleaning of Rugs and carpets, washing of curtains, draperies, bed linens and kitchen linen, Drying and &pressing; Washing Methods: Kneading and squeezing, Suction washing, Use of washing Machine; Stain Removal: Identification of stain, general procedure for stain removal, Bleaches for stain removal, optical brighteners and blues; Testing of home textiles - color fastness, shrinkage, abrasion and flammability tests.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Summarize types of home textiles and materials used for home textiles

CO2 Assess suitability of upholstery, table textiles, living room furnishing, kitchen textiles, curtains and draperies according to customer needs.

CO3 Analyse bed linen and &towels requirements in technical terms

CO4 Select floor coverings according to specific needs

CO5 Discuss about care of home textiles, washing methods, stain removal and testing of home textiles

TEXT BOOK

1 Subrata Das., Performance of Home Textiles, Wood head Publishing India PVT. LTD, 2010

2 Fundamentals of Textiles and their care, Susheela Dantiyagi. Orient Longman Ltd., New Delhi

3 Household Textiles and Laundry work, DurgaDuelkar, Athma Ram and Sons, New Delhi

4 Soft furnishing book by Kartin Cargill, Reed consumer books Limited, London

REFERENCE BOOK

1 Simplicity's (1993). Simply the best home decoration book, A fire side book as published by Simon and Schulster (New York), London. The simplicity Pattern company inc

2 Soft furnishing by Saarah Campbell and Hilary More, Mac Donald Books, QED Publishers Limited, London

3 Wingate I.B., & Mohler J.E., Textile Fabrics & Their Selection, Prentice Hall Inc, New York

4 Alexander N.G., Designing Interior Environment, Mass Court Brace Covanorich, New York, 1972

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OPEN ELECTIVE

HTOE301 PRODUCT DESIGN

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

1 To acquire the basic concepts of product design and development process
2 To understand the engineering and scientific process in executing a design from concept to finished product
3 To study the key reasons for design or redesign.

Unit 1 9

Definition of a product; Types of product; Levels of product; Product-market mix; New product development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morphological analysis; Analysis of interconnected decision areas; Brain storming.

Unit 2 9

Product life cycle; The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process; Customer need identification; Product development practices and industry-product strategies

Unit 3 9

Product design; Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design.

Unit 4 9

Introduction to optimization in design; Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and design for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Prototyping (RP); Application of RP in product design; Product Development versus Design.

Unit 5 9

Design of simple products dealing with various aspects of product development; Design starting from need till the manufacture of the product,

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Understand the basic concepts of product design and development process.

CO2 Illustrate the methods to define the customer needs.

CO3 Describe an engineering design and development process.

CO4 Understand the intuitive and advanced methods used to develop and evaluate a concept.

CO5 Apply modelling and embodiment principles in product design and development process.

REFERENCE BOOK

1 Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.

2 Engineering Design –George E. Dieter.

3 An Introduction to Engineering Design methods Vijay Gupta.

4 Merie Crawford : New Product management, McGraw-Hill Irwin.

5 Chitale A K and Gupta R C, “Product Design and Manufacturing”, Prentice Hall of India, 2005.

6 Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.

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HTOE202 INTRODUCTION TO E-GOVERNANCE

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To cover the concepts of e-Governance and to understand how technologies and business models shape the contours of government for improving citizen services and bringing in transparency.

Unit 1 9

Exposure to emerging trends in ICT for development; Understanding of design and implementation of e-Government projects, e-governance lifecycle.

Unit 2 9

Need for Government Process Re-engineering (GPR); National e-Governancelan (NeGP) for India; SMART Governments & Thumb Rules

Unit 3 9

Architecture and models of e-Governance, including Public Private Partnership (PPP); Need for In- novation and Change Management in e-Governance; Critical Success Factors; Major issue including corruption, resistance for change, e-Security and Cyber laws

Unit 4 9

Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context.

Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.

Unit 5 9

Mini Projects by students in groups – primarily evaluation of various e-governance projects.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

Through exposure to introductory ideas and practices followed in a selected number of e-Governance initiatives in India, the course will help students to understand and appreciate the essence of e-Governance.

REFERENCE BOOK

1 Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice HallIndia
2 The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India PvtLtd.
3 e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall,India
4 http://www.csi-sigegov.org/publications.php
5 https://negd.gov.in
6 https://www.nisg.org/case-studies-on-e-governance-in-india

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HTOE304 ENGINEERING ECONOMICS & ACCOUNTANCY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

1 To acquire knowledge of basic economics to facilitate the process of economic decision making
2 To acquire knowledge on basic financial management aspects.
3 To develop the basic skills to analyze financial statements.

Unit 1 INTRODUCTION 9

Managerial Economics; Relationship with other disciplines; Firms: Types, objectives and goals; Managerial decisions; Decision analysis.

Unit 2 DEMAND & SUPPLY ANALYSIS 9

Demand; Types of demand; Determinants of demand; Demand function; Demand elasticity; Demand forecasting; Supply; Determinants of supply; Supply function; Supply elasticity.

Unit 3 PRODUCTION AND COST ANALYSIS 9

Production function; Returns to scale; Production optimization; Least cost input;

Isoquants; Managerial uses of production function; Cost Concepts; Cost function; Types of Cost; Determinants of cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.

Unit 4 PRICING 9

Determinants of Price; Pricing under different objectives and different market structures; Price discrimination; Pricing methods in practice; Role of Government in pricing control.

Unit 5 FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT) 9

Balance sheet and related concepts; Profit & Loss Statement and related concepts; Financial Ratio Analysis; Cash flow analysis; Funds flow analysis; Comparative financial statements; Analysis & Interpretation of financial statements; Investments; Risks and return evaluation of investment decision; Average rate of return; Payback Period; Net Present Value; Internal rate of return,

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

- CO1 Understand the macro-economic environment of the business and its impact on enterprise
- CO2 Understand cost elements of the product and its effect on decision making
- CO3 Prepare accounting records and summarize and interpret the accounting data for managerial decisions
- CO4 Understand accounting systems and analyze financial statements using ratio analysis
- CO5 Understand the concepts of financial management and investment

REFERENCE BOOK

1. Premvir Kapoor, Sociology & Economics for Engineers, Khanna Publishing House, New Delhi, 2018
2. McGuigan, Moyer and Harris, ‘Managerial Economics; Applications, Strategy and Tactics’, Thomson South Western, 10th Edition, 2005.
3. Prasanna Chandra. ‘Fundamentals of Financial Management’, Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.
4. Samuelson. Paul A and Nordhaus W.D., ‘Economics’, Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
5. Paresh Shah, ‘Basic Financial Accounting for Management’, Oxford University Press, New Delhi, 2007. 3. Salvatore Dominick, ‘Managerial Economics in a global economy’. Thomson South Western, 4th Edition, 2001

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HTOE309 ENERGY CONSERVATION AND AUDIT

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

1 Undertake energy conservation and energy audit.

Unit 1 ENERGY CONSERVATION BASICS ENERGY SCENARIO 9

Primary and Secondary Energy, Energy demand and supply, National scenario. Energy conservation and Energy audit; concepts and difference Indian Electricity Act 2001; relevant clauses of energy conservation BEE and its Roles MEDA and its Roles Star Labelling: Need and its benefits.

Unit 2 ENERGY CONSERVATION IN ELECTRICAL MACHINES 9

Need for energy conservation in induction motor and transformer. Energy conservation techniques in induction motor by: Improving Power quality. Motor survey Matching motor with loading. Minimizing the idle and redundant running of motor. Operating in star mode. Rewinding of motor. Replacement by energy efficient motor Periodic maintenance Energy conservation techniques in Transformer. Loading sharing Parallel operation Isolating techniques. Replacement by energy efficient transformers. Periodic maintenance. Energy Conservation Equipment: Soft starters, Automatic star delta convertor, Variable Frequency Drives, Automatic p. f. controller (APFC), Intelligent p. f. controller (IPFC) Energy efficient motor; significant features, advantages, applications and limitations. Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Dry type of transformer.

Unit 3 ENERGY CONSERVATION IN ELECTRICAL INSTALLATION SYSTEMS 9

Aggregated Technical and commercial losses (ATC); Power system at state, regional, national and global level.

Technical losses; causes and measures to reduce by.

a) Controlling I2 R losses.

b) Optimizing distribution voltage

c) Balancing phase currents

d) Compensating reactive power flow

Commercial losses: pilferage, causes and remedies

Energy conservation equipment: Maximum Demand Controller, kVAR Controller, Automatic Power Factor controller (APFC)

Energy Conservation in Lighting System

a) Replacing Lamp sources.

b) Using energy efficient luminaries.

c) Using light controlled gears.
d) Installation of separate transformer / servo stabilizer for lighting.
e) Periodic survey and adequate maintenance programs.
Energy Conservation techniques in fans, Electronic regulators.

Unit 4 ENERGY CONSERVATION THROUGH COGENERATION AND TARIFF 9

Co-generation and Tariff; concept, significance for energy conservation Co-generation Types of cogeneration on basis of sequence of energy use (Topping cycle, Bottoming cycle) Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration, Reciprocating engine cogeneration). Factors governing the selection of cogeneration system. Advantages of cogeneration. Tariff: Types of tariff structure: Special tariffs; Time-off-day tariff, Peak-off-day tariff, Power factor tariff, Maximum Demand tariff, Load factor tariff. Application of tariff system to reduce energy bill.

Unit 5 ENERGY AUDIT OF ELECTRICAL SYSTEM 9

Energy audit (definition as per Energy Conservation Act) Energy audit instruments and their use. Questionnaire for energy audit projects. Energy flow diagram (Sankey diagram) Simple payback period, Energy Audit procedure (walk through audit and detailed audit). Energy Audit report format.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Interpret energy conservation policies in India.
CO2 Implement energy conservation techniques in electrical machines.
CO3 Apply energy conservation techniques in electrical installations.
CO4 Use Co-generation and relevant tariff for reducing losses in facilities.
CO5 Undertake energy audit for electrical system

REFERENCE BOOK

1 Guide Books No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (A Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
2 O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
3 Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978- 0195606539
4 Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
5 Sharma, K. V., Venkataseshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298

6 Mehta ,V. K., Principles of Power System, S. Chand &Co.New Delhi, 2016, ISBN 9788121905947
7 Singh, Sanjeev; Rathore, Umesh, Energy Management, S K Kataria&Sons,New Delhi ISBN-13: 9789350141014
8 Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R., Efficient Use and Management of Electricity in Industry, Devki Energy Consultancy Pvt. Ltd.
9 Chakrabarti, Aman, Energy Engineering And Management, e-books Kindle Edition

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HTOE310 RENEWABLE ENERGY TECHNOLOGIES

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

1 To understand present and future scenario of world energy use.
2 To understand fundamentals of solar energy systems.
3 To understand basics of wind energy. 445 Open Elective Courses
4 To understand bio energy and its usage in different ways.
5 To identify different available non-conventional energy sources.

Unit 1 INTRODUCTION 9

World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilisation; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

Unit 2 SOLAR ENERGY 9

Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

Unit 3 WIND ENERGY 9

Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit 4 BIO-ENERGY 9

Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

Unit 5 OTHER RENEWABLE ENERGY SOURCES 9

Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Understand present and future energy scenario of the world.
CO2 Understand various methods of solar energy harvesting.
CO3 Identify various wind energy systems.
CO4 Evaluate appropriate methods for Bio energy generations from various Bio wastes.
CO5 Identify suitable energy sources for a location.

REFERENCE BOOK

1 O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2 Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3 Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4 Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996
5 Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6 Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7 Energy and The Environment, RA Ristinen and J J Kraushaar, Second Edition, John Willey & Sons, New York, 2006.
8 Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

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OPEN ELECTIVE – II

HTOE305 PROJECT MANAGEMENT

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

1 To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
2 To develop an understanding of key project management skills and strategies.

Unit 1 CONCEPT OF A PROJECT 9

Classification of projects- importance of project management- The project life cycle- establishing project priorities (scope-cost-time) project priority matrix- work break down structure.

Unit 2 CAPITAL BUDGETING PROCESS 9

Planning- Analysis-Selection-Financing-Implementation-Review. Generation and

screening of project ideas- market and demand analysis- Demand forecasting techniques. Market planning and marketing research process- Technical analysis

Unit 3 FINANCIAL ESTIMATES AND PROJECTIONS 9

Cost of projects-means of financing-estimates of sales and production-cost of production-working capital requirement and its financing-profitability projected cash flow statement and balance sheet. Break even analysis.

Unit 4 BASIC TECHNIQUES IN CAPITAL BUDGETING 9

Non discounting and discounting methods- payback period- Accounting rate of return-net present value-Benefit cost ratio-internal rate of return. Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects.

Unit 5 PROJECT ADMINISTRATION 9

Progress payments, expenditure planning, project scheduling and network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade off.

Concepts and uses of PERT cost as a function of time, Project Evaluation and Review Techniques/cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management software's.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Understand the importance of projects and its phases.
CO2 Analyze projects from marketing, operational and financial perspectives.
CO3 Evaluate projects based on discount and non-discount methods.
CO4 Develop network diagrams for planning and execution of a given project.
CO5 Apply crashing procedures for time and cost optimization.

REFERENCE BOOK

1 Project planning, analysis, selection, implementation and review – Prasanna chandra – Tata McGraw Hill
2 Project Management – the Managerial Process – Clifford F. Gray & Erik W. Larson - McGraw Hill
3 Project management - David I Cleland - Mcgraw Hill International Edition, 1999
4 Project Management – Gopala krishnan – Mcmillan India Ltd.
5 Project Management-Harry-Maylor-Peason Publication

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HTOE306 OPERATIONS RESEARCH

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To provide a broad and in depth knowledge of a range of operation research models and techniques, which can be applied to a variety of industrial applications.

Unit 1 9

Development, Definition, Characteristics and phase of Scientific Method, Types of models; General methods for solving operations research models.

Unit 2 9

Allocation: Introduction to linear programming formulation, graphical solution, Simplex Method, artificial variable technique, Duality principle. Sensitivity analysis.

Unit 3 9

Transportation Problem Formulation optimal solution. Unbalanced transportation problems, Degeneracy. Assignment problem, Formulation optimal solution

Unit 4 9

Sequencing: Introduction, Terminology, notations and assumptions, problems with n-jobs and two machines, optimal sequence algorithm, problems with n-jobs and three machines.

Unit 5 9

Theory of games: introduction, Two-person zero-sum games, The Maximum – Minimax principle, Games without saddle points – Mixed Strategies, 2 x n and m x 2 Games – Graphical solutions, Dominance property, Use of L.P. to games.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

- CO1 Understand the formulation of Liner Programming
- CO2 Analyze and Convert the problem into a mathematical model.
- CO3 Understand and implement the transportation problems at workplace
- CO4 Understand sequencing to optimize the process time for n- job and m-machine
- CO5 Identify and select suitable methods for various games and apply the LP

REFERENCE BOOK

1. Operations Research: an introduction, Hamdy A. Taha, Pearson Education.
2. Operations. Research: theory and application, J.K. Sharma, Macmillan Pubishers.
3. Introduction to Operations Research: concept and cases, Frederick S. Hillier and Gerald J. Lieberman, Tata McGraw-Hill

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HTOE307 INTERNET OF THINGS

COURSE OBJECTIVES

L	T	P	C
2	1	0	3

Internet of Things (IoT) is presently an important technology with wide ranging interest from Government, academia and industry. IoT cuts across different application domain verticals ranging from civilian to defence sectors which includes agriculture, space, health care, manufacturing, construction, water, mining, etc. Today it is possible to build different IoT solutions such as shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems. Therefore, it is very important to learn the fundamentals of this emerging technology

Unit 1 9

Introduction to IoT; Sensing; Actuation

Unit 2 9

Basics of IoT Networking, Communication Protocols, Sensor networks

Unit 3 9

Introduction to Arduino programming, Integration of Sensors/Actuators to Arduino

Unit 4 9

Implementation of IoT with Raspberry Pi; Data Handling Analytics

Unit 5 9

Case Studies: Agriculture, Healthcare, Activity Monitoring

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

- Understanding of various aspect of IoT, know some tools and have basic implementation skills.

REFERENCE BOOK

1 https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22

2 “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, by Pethuru Raj and Anupama C. Raman (CRC Press)

3 Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)

4 “Internet of Things: A Hands-on Approach”, by Arshdeep Bahga and Vijay Madisetti (Universities Press)

5 Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill

6 Research papers

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HTOE311 DISASTER MANAGEMENT

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

Following are the objectives of this course:

1 To learn about various types of natural and man-made disasters.
2 To know pre- and post-disaster management for some of the disasters.
3 To know about various information and organisations in disaster management in India.
4 To get exposed to technological tools and their role in disaster management.

Unit 1 UNDERSTANDING DISASTER 9

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management.

Unit 2 TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTERS 9

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire);

Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

Unit 3 DISASTER MANAGEMENT CYCLE AND FRAMEWORK 9

Disaster Management Cycle – Paradigm Shift in Disaster Management. Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Stretegy, Hyogo Framework of Action.

Unit 4 DISASTER MANAGEMENT IN INDIA 9

Disaster Profile of India – Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national),Non-Government and Inter Governmental Agencies

Unit 5 APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT 9

Geo-informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters S&T Institutions for Disaster Management in India.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Acquainted with basic information on various types of disasters
CO2 Knowing the precautions and awareness regarding various disasters
CO3 Decide first action to be taken under various disasters
CO4 Familiarised with organisation in India which are dealing with disasters
CO5 Able to select IT tools to help in disaster management

REFERENCE BOOK

1 Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2 Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3 Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4 Alexander, David, Natural Disasters, Kluwer Academic London
5 Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6 . Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd

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HTOE312 MARKETING MANAGEMENT AND FOREIGN TRADE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

To impart knowledge to students on,

- Marketing strategies', consumer behavior and market research, Foreign trade, agreements, documentation procedures and policies of Import / Export market.

Unit 1 MARKETING 9

Introduction to Marketing - marketing in a developing economy – Marketing of services – planning marketing mix – market segmentation – Marketing research and its applications.

Unit 2 CONSUMER BEHAVIOUR 9

Understanding Consumers - Determinants of Consumer behaviour – models of Consumer Behaviour – Indian Consumer Environment.

Unit 3 ELEMENTS OF MARKETING MIX 9

PRODUCT - PRICING - Marketing channels, Wholesaling, Retailing.
PROMOTION –Advertising, Sales promotion, Personnel selling, Publicity.
Market Research. Definition, Methods of research, Steps, Need and Importance.

Unit 4 FOREIGN TRADE 9

Definition, Importance, Types – Import, Export, Re-export; Features of foreign trade. Functions and objectives of WTO-Concepts of GATT and MFA.

Unit 5 EXPORT DOCUMENTATION 9

Order confirmation, various types of export documents, pre-shipment and post-shipment documentation, terms of sale, payment and shipment. Duty drawback, DEPB, I/E licenseexchange control regulation-foreign exchange regulation acts-export management risk-export finance.

Total: 45 Hour

COURSE OUTCOMES:

At the end of the study of this course, the students will be able to

CO1 Identify the market and segments of marketing.
CO2 Describe the concepts of consumer behaviour.
CO3 Explain the various elements involved in marketing and market research.
CO4 Define foreign trade and ~~on~~ discuss in detail the functions of WTO.
CO5 Prepare various documents required for exports

TEXT BOOK

1 Philip Kotler, “Marketing Management”, PHI publications, 2004.
2 Raj Agarwal, “Indian Foreign Trade”,Excel books,2002

REFERENCE BOOK

1 Evans. J. R. “Marketing: Marketing In The 21st Century”, 8th edition, 2003.
2 S.Shivaramu, “Export Marketing – A practical Guide to Exporters”, McGraw-Hill Book Company, 1985.
3 D. Sinha, “Export Planning and Promotion”, IIM, Calcutta, 1981.
4 5. S.Shivaramu. “Export Marketing” – A Practical Guide to Exporters”, Wheeler Publishing, ISBN: 81-7544-166-6, 1996.

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PDTP Curriculum

INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY

Salem & Varanasi

POST DIPLOMA IN TEXTILE PROCESSING

REGULATION 2021 – CURRICULUM

Sl No	Category of Course	Code No	Course Title	Hours/week			Total credit Hrs/week	Credits
				L	T	P		
SEMESTER - I								
1	Programme Core	PDTP101	Fibre Science	3	0	0	3	3
2	Programme Core	PDTP102	Technology of Preparatory Processing of Textiles	4	0	0	4	4
3	Programme Core	PDTP103	Technology of Dyeing-I	4	0	0	4	4
4	Programme Core	PDTP104	Introduction to Textile Manufacture	3	0	0	3	3
5	Programme Core	PDTP105	Fibre Identification & Technical Analysis Practice	0	0	3	3	1.5
6	Programme Core	PDTP106	Preparatory Textile Processing Practice	0	0	6	6	3
7	Programme Core	PDTP107	Textile Dyeing Practice-I	0	0	6	6	3
				Total Credits				**21.5**
SEMESTER - II								
1	Programme Core	PDTP201	Textile Testing & Quality Control	4	0	0	4	4
2	Programme Core	PDTP202	Soft Silks & Personality Development	3	0	0	3	3
3	Programme Core	PDTP203	Technology of Dyeing-II	4	0	0	4	4
4	Programme Core	PDTP204	Technology of Printing-I	4	0	0	4	4
5	Programme Core	PDTP205	Textile Texting Practice	0	0	6	6	3
6	Programme Core	PDTP206	Textile Dyeing Practice-II	0	0	6	6	3
7	Programme Core	PDTP207	Computer Colour Matching Practice	0	0	3	3	1.5
				Total Credits				**22.5**
SEMESTER - III								
1	Programme Core	PDTP301	Technology of Printing –II	4	0	0	4	4
2	Programme Core	PDTP302	Technology of Finishing	4	0	0	4	4
3	Programme Core	PDTP303	Chemistry of Intermediates & Dyes	3	0	0	3	3
4	Programme Core	PDTP304	Ecology & Pollution Control in Textile Industry	3	0	0	3	3
5	Programme Core	PDTP305	Project Work	0	0	6	6	3
6	Programme Core	PDTP306	Textile Finishing Practice	0	0	6	6	3
7	Programme Core	PDTP307	Textile Printing Practice	0	0	6	6	3
				Total Credits				**23**

PDTP Syllabus

INDIAN INSTITUTE OF HANDLOOM TECHNOLOGY
POST DIPLOMA IN TEXTILE PROCESSING
REGULATION 2021

SEMESTER I

PDTP101 : FIBRE SCIENCE

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To make the students understand about the introduction of different fibres, polymers and their manufacturing processes.

Unit 1 INTRODUCTION OF TEXTILE FIBRES & POLYMERS AND THEIR CLASSIFICATION 9

1. Fibers -Definition, Classification on fibers, important characteristics of Textile fibers:
2. Classification of polymer - Homo polymer, Co-Polymer, Atactic, Syndiotactic and isotactic polymer, branch & linear polymer.
3. Types of polymerization addition and condensation, orientation.
4. Fiber structure, Concept of Crystallinity, Amorphous region, Glass transition temperature and melting point.

Unit 2 MANUFACTURING PROCESS OF SYNTHETIC FIBRES AND TEXTURIZING 9

1. Techniques of Spinning of manmade fibers: Wet Spinning, Dry Spinning& Melt Spinning.
2. Application of Spin Finish.
3. Texturizing, Importance of Texturizing process, Types of texturizing process.

Unit 3 STRUCTURE AND PROPERTIES OF NATURAL FIBRES 9

1. Structure, Physical & Chemical properties of Cotton, Wool and Silk.
2. Formation of hydro and oxy cellulose.
3. Concept of Zwitter ion & Isoelectric region in Protein Fibres.

Unit 4 MANUFACTURING PROCESS OF REGENERATED &POLYESTER FIBRES WITH THEIR PROPERTIES 9

1. Manufacturing process of viscose fiber, Cellulose acetate, Lyocell
2. Physical and Chemical properties of Viscose, cellulose acetate and Lyocell.
3. Manufacturing process of polyester fiber, Physical and chemical properties of polyester fiber.
4. Concept of heat setting.

Unit 5 MANUFACTURING PROCESS OF POLYAMIDES, POLY ACRYLONITRILE AND OTHER FIBRESWITH THEIR PROPERTIES 9

1. Manufacturing process of Nylon-6 & Nylon-66.Physical and Chemical properties of Polyamide fibers.
2. Manufacturing process of Acrylonitrile fibers. Physical and Chemical properties of Acrylonitrile fiber.
3. Manufacturing process of PE &PP fibers. Physical and Chemical properties of PE & PP fibers.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Textile fibres their structures and classification, Types of polymers and polymerization
CO2 Types of spinning techniques and texturizing process
CO3 Structure and properties of natural fibres
CO4 Properties and manufacturing process of regenerated and polyester fibre
CO5 Manufacturing processes and properties of synthetic fibres

TEXT BOOK

1 Gupta, V.B., Kothari, V.K., Manufactured Fibre Technology, Springer Netherlands, 1997
2 S P Mishra, Fibre Science and Technology, New-Age International Ltd...New Delhi, 199
3 Vaidya A A, Production of Synthetic Fibres, Prentice Hall of India, New Delhi, 1988

REFERENCE BOOK

1 Cook Gordon J, Hand Book of Textile fibre, Vol.I and II, WoodheadFibre Science series, UK, 1984
2 Ed. M Lewin and E M Pearce, Hand Book of Fibre Chemistry, Mercel Dekker Inc., 1998
3 Shenai V A, Textile Fibre, Sevak Publications, Mumbai
4 R.W. Moncrieff, Manmade Fibres, Butterworth, London
5 Gowariker V R, Viswanathan N V and Sridhar J, Polymer Science, New AgeInternational Ltd., New Delhi, 1996.
6 B.L. Deopura, B. Gupta, Man-Made Fibres.
7 Chemical Technology of Fibrous Materials by F. Sadov.

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PDTP102 : TECHNOLOGY OF PREPARATORY PROCESSING OF TEXTILES

	L	T	P	C
COURSE OBJECTIVES	4	0	0	4

To make the students understand morphology, chemical aspects and composition of raw Cotton, Wool and Silk. Study of preparatory processes of different textile fibres and evaluation of defects and damages.

Unit 1 INTRODUCTION TO PREPARATORY PROCESSES OF COTTON MATERIAL 12

1. Morphological and chemical aspects of Cotton.
2. Composition of Raw Cotton.
3. Dry Preparatory Process viz. Mending, Stitching, Shearing & Cropping, Spotting and Singeing.
4. Need for preparation of Grey Goods for dyeing and printing.
5. Desizing, scouring and bleaching of cotton with Hypo Chlorites, Hydrogen Peroxide and Sodium Chlorite.
6. Comparative study of various methods of bleaching.
7. Solvent scouring.
8. Introduction to Mecerization.

Unit 2 INTRODUCTION TO PREPARATORY PROCESS OF PROTEIN FIBRES 12

1. Morphological, Chemical aspects and composition of raw Wool and Silk.
2. Methods of scouring Wool (Suint, Emulsion, Solvent and Freezing) and its machines.
3. Milling of Woollens.
4. Methods of Degummimg silk with soap, mild alkali and enzymes.

Unit 3 STUDY OF PRETREATMENTS OF PROTEIN AND SYNTHETIC FIBRES. 12

1. Bleaching of Wool with Hydrogen Peroxide.
2. Bleaching of Silk with Hydrogen Peroxide.
3. Setting process for Woollens viz. Potting, Crabbing and Decatising.
4. Need for preparatory treatment for important manmade fibres viz. Polyester, Nylon and Acrylic.
5. Method of Scouring and Bleaching for Polyester, Nylon, Acrylic.

Unit 4 STUDY OF DIFFERENT TEXTILE WET PROCESSING MACHINES 12

1. Description and working of Singeing M/c, Kier and J-Box.
2. Preparatory process sequences for different cotton Materials (for white, to be Dyed in pale and medium shades and / or to be printed goods).
3. Working & Principle of machines like Hydroextractor, Winch & Scutcher.

Unit 5 STUDY OF CONTINUOUS BLEACHING AND GARMENT WASHING MACHINES. STUDY OF AUXILIARIES AND DEFECTS AND DAMAGES IN PREPARATORY PROCESSES. 12

1. Working of continuous bleaching ranges and garment washing machines.
2. A review of chemical auxiliaries used in preparatory processing of textile viz. Surfactants, sequestering agents, wetting agents, detergents and optical brightners.
3. Defects & damages caused in Singeing, Scouring and Bleaching.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Structure of cotton, Dry and wet preparatory processes of cotton
CO2 Structure and Preparatory processes of protein fibres
CO3 Bleaching of protein fibres and preparatory process for man made fibres
CO4 Machines used in preparatory processes and process sequence for different cotton materials.
CO5 Defects caused in preparatory processes, working of bleaching ranges and chemical auxiliaries used in preparatory processes

TEXT BOOK

1 Chemical Processing of Textiles by Dr. C.V. Kaushik and Mr. Antao Irwin Josico, NCUTE
2 Technology of Scouring and Bleaching, Trotman E.R., Griffin, London, 1968.
3 Technology of Textile processing Vol. II, III & VI by Dr. V AShenai
4 Technology of Dyeing by Dr. V A Shenai
5 Guide to Wet Textile Processing Machines by J. N. Shah, Elsevier Science & Technology

REFERENCE BOOK

1 Technology of Bleaching and Mercerizing, Shenai V.A., Sevak Publication, Bombay, Vol. - 3, 3rd edition, 2003
2 Textile Bleaching, Steven A.B., Pitman and Sons, London.
3 Textile Preparation and Dyeing, Asim Kumar Roy Choudhury, Oxford and IBH Publishing Co. Pvt. Ltd., 2006.

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PDTP103 : TECHNOLOGY OF DYEING – I

	L	T	P	C
COURSE OBJECTIVES	4	0	0	4

To make the students understand the basic concepts of dyeing. Definition of dyes and pigments. Classification of dyes according to their application methods. Process of dyeing for cotton, wool and silk.

Unit 1 INTRODUCTION OF DYES AND PIGMENTS &CLASSIFICATION OF DYES 12

1. Definition of Dyes, Pigments, Auxochrome and Chromophore.
2. Classification of dyes with respect to their application on Textile Fibres.
3. Criteria for selection of dyes.
4. Basic concepts involved in dyeing such as substantivity, Solubility, affinity, theory of dyeing & role of Zeta Potential in Cotton.
5. Basic parameters of dyeing viz. Percentage of shade, Percentage of exhaustion, percentage expression and effects of MLR.

Unit 2 PRINCIPLES AND APPLICATION METHODS OF DIRECT, AZOIC AND SULPHUR DYES. 12

1. Principles and methods of application of Direct Dyes with function of chemicals used and effect of process conditions.
2. After treatments of cotton dyed with Direct dyes.
3. Principle and methods of application of Azoic with function of chemicals used and effect of process conditions.
4. Principle and methods of application of Sulphur Dyes with function of chemicals used and effect of process conditions.

Unit 3 PRINCIPLE AND APPLICATION METHOD OF VAT AND REACTIVE DYES 12

1. Classification of Vat dyes in accordance with their chemical constitution
2. Principle and methods of application of vat dyes on cotton
3. Principle and methods application of Solubilized vat dyes on cotton
4. Classification of Reactive dyes. Concept of Mono functional and Bi-functional Reactive dyes.
5. Principle and methods of application of Reactive dyes on cotton.

Unit 4 MECHANISM AND METHOD OF DYEING OF WOOL AND SILK 12

1. Structural concept of wool and silk in relation to their dyeing i.e. amphoteric character and iso-electric region
2. Dyeing of wool with Acid dyes, Chrome dyes and Metal Complex dyes
3. Dyeing of Silk with Acid dyes& Metal Complex dyes
4. Mechanism of acid dye dyeing on wool and silk

Unit 5 WORKING PRINCIPLE OF WET PROCESSING MACHINES AND CONCEPT OF BANNED DYES 12

1. Concept of Banned dyes.
2. Description and working of various machines used for wet processing viz. Jigger, Winch, Cabinet hank dyeing machine, Yarn Package dyeing machine and Padding Mangle

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Classification of Dyes, Basic concepts &parameters used in dyeing
CO2 Application of direct, azoic and sulphur dyes on cotton
CO3 Application of Vat, solubilized vat and reactive dyes on cotton
CO4 Application of acid, chrome and metal complex dyes on protein fibres
CO5 Banned dyes and working of various processing machines

TEXT BOOK

1 Chemical Processing of Textiles by Dr. C.V. Kaushik and Mr. Antao Irwin Josico, NCUTE
2 Technology of Scouring and Bleaching, Trotman E.R., Griffin, London, 1968.
3 Technology of Textile processing Vol. II, III & VI by Dr. V AShenai
4 Technology of Dyeing by Dr. V AShenai
5 Guide to Wet Textile Processing Machines by J. N. Shah, Elsevier Science & Technology
6 Chemical Processing of Textiles by M.V.sapatnekar

REFERENCE BOOK

1 Technology of Bleaching and Mercerizing, Shenai V.A., Sevak Publication, Bombay, Vol. - 3, 3rd edition, 2003
2 Textile Bleaching, Steven A.B., Pitman and Sons, London.
3 Textile Preparation and Dyeing, Asim Kumar Roy Choudhury, Oxford and IBH Publishing Co. Pvt. Ltd., 2006
4 Dyeing and Chemical Technology of Textile Fibres by E.R.Tortman
5 Glimpses of Textile Processing by R.R.Chakarvarty
6 Hand book of textile processing machinery by R.S. Bhagwat

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PDTP104 : INTRODUCTION TO TEXTILE MANUFACTURE

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To make the students understand about fibres, Spinning, Weaving preparatory and types of looms

Unit 1 INTRODUCTION OF TEXTILE FIBRES,YARN& FABRIC 9

1. Basic terms and definition used in textile manufacture.
2. Introduction to various textile fibres used in the industries.
3. Classification of various types of yarns (single, folded & fancy etc.) & overview of their general properties,
4. Classification of various types of fabrics (Woven, Knitted & non-woven fabrics etc.)

Unit 2 INTRODUCTION OF SPINNING 9

1. Flow chart of spinning for cotton, woollens and worsted yarn.
2. Outline of processes involved in cotton spinning such as Blow room. Carding, drawing, combing, speed frame, ring frame & winding process.
3. Outline of reeling, throwing process involved in silk.

Unit 3 INTRODUCTION OF WEAVING PREPARATORY. 9

1. Defects and Damages in yarn manufacture.
2. Yarn numbering systems and basic calculations.
3. Outline of weaving preparatory process such as weft winding, warping, sizing, Beaming, Drawing and denting.
4. Outline of sizing process with its objectives and ingredients used.

Unit 4 INTRODUCTION OF ELEMENTARY WEAVES & KNITTING 9

1. Introduction of elementary weaves (Plain, twill, satin, sateen).
2. Introduction of knitting and types of knitting machines.
3. Comparison between general properties of woven and knitted fabrics.
4. Machines used in knitting

Unit 5 INTRODUCTION OF DIFFERENT LOOMS AND DEFECTS OF FABRIC. 9

1. Introduction of different types of handlooms, power looms and shuttleless looms.
2. Study of passage of warp on loom, calculations for yarn weight and fabric weight.
3. Study of various types fabric defects.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Basic Terms and textile fibres used in textile manufacturing, classification of yarns and fabrics

CO2 Spinning processes for cotton/woollen/worsted yarn and silk reeling

CO3 Various weaving preparatory processes, yarn numbering system

CO4 Introduction of elementary weaves and type of knitting machines

CO5 Types of handlooms, yarn/fabric weight calculation and types of fabric defects

TEXT BOOK

1 Marks. R and Robbinson. A. T. C, “Principle of Weaving”, 1976.

2 Talukdar M. K., Sriramulu P. K. and Ajgaonkar D. B, “Weaving Machine, Mechanism, Management”,1998.

3 Banerjee N.N, “Weaving Mechanism”, 1982.

4 Sengupta, “Weaving Calculation”, 1963.

5 TAI, “Weaving Tablets”, 2013.
6 Lord.P.R and Mohamad, “Weaving: Conversion from yarn to Fabric”, 1982.
7 Textile Mathematics Vol 3 by J E Booth.
8 Fabric Manufacture Vol 1 & 2 by NCUTE.
9 V.B. Gupta & V.K.Kothari Manufactured Fibre Technology

REFERENCE BOOK

1 Hanton, WA, “Mechanics for Textiles Student an Introduction to the study of mechanics for Textiles student”, 1960.
2 Greenwood, Hony., “Hand book of weaving and manufacturing”, 2nd Edition, 1954.
3 Rama Verma, “Handloom weaving”, 1959.
4 David Ezakia, “Preparatory Process for weaving with calculation: including Development of the modern Power Loom”
5 Z Grosicki, “Watsons Textile Design and Colour ”, 2nd Edition

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PDTP105 : FIBRE IDENTIFICATION & TECHNICAL ANALYSIS PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

To make the students understand about estimation of various auxiliaries used in processing and identifications of fibres

LIST OF PRACTICALS /ACTIVITIES

1. Analysis of water sample for assessment of various types of hardness.
2. Estimation of Soda Ash sample assessment of its percentage purity.
3. Estimation of Caustic Soda sample for assessment of its percentage purity.
4. Estimation of Bleaching powder sample for assessment of its percentage purity.
5. Estimation of Hydrogen peroxide sample for assessment of its percentage purity.
6. Estimation of Sulphuric acid sample for assessment of its percentage purity.
7. Estimation of Hydrochloric acid sample for assessment of its percentage purity.
8. Estimation of Sodium hydrosulphite sample for assessment of its percentage purity.
9. Identification of textile fibres by microscopic test.
10. Identification of textile fibres by burning test.
11. Identification of textile fibres by solubility test.
12. Analysis of blended yarn and fabric comprising of cotton, viscose and polyester.

Total: 30 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Assessment of water hardness
CO2 Estimation of alkalies

CO3 Estimation of bleaching agents
CO4 Estimation of mineral acid
CO5 Tests for identification of textile fibres and blend analysis

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PDTP106 : PREPARATORY TEXTILE PROCESSING PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	6	3

To make the students understand about the preparatory processes of cotton, protein fibres and polyester.

LIST OF PRACTICALS /ACTIVITIES

1. Desizing of cotton fabric by Acid Steeping Method.
2. Desizing of cotton fabric by Enzyme Method.
3. Scouring of cotton yarn/fabric.
4. Bleaching of cotton yarn/fabric with Hypochlorite Method.
5. Bleaching of cotton yarn/fabric with Hydrogen Peroxide Method.
6. Optional Whitening of bleached cotton fabric by optical brightners.
7. Degumming of Silk yarn/fabric.
8. Bleaching of Silk yarn/fabric.
9. Scouring of Woollens yarn/fabric.
10. Bleaching of Woollens yarn/fabric.
11. Bleaching of pure synthetic fabric with sodium chlorite.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Methods of desizing of cotton
CO2 Bleaching of cotton
CO3 Scouring and bleaching of wool and silk
CO4 Bleaching of synthetic fibres

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PDTP 107 : TEXTILE DYEING PRACTICE – I

	L	T	P	C
COURSE OBJECTIVES	0	1	2	3

To make the students understand about dyeing of cotton and protein fibres with different dyes.

LIST OF PRACTICALS /ACTIVITIES

1. Dyeing of cotton with direct dyes.
2. After treatments of cotton dyed with direct dyes using cationic dye fixing agent.
3. Study of effect of temperature on dyeing of cotton.
4. Study of effect of MLR on dyeing of cotton.
5. Study of effect of electrolytes on dyeing of cotton.
6. Dyeing of cotton with azoic dyes.
7. Dyeing of cotton with vat dyes.
8. Dyeing of cotton with reactive dyes.

9. Dyeing of cotton with sulphur dyes.
10. Dyeing of cotton with solubilised vat dyes.
11. Dyeing of silk and wool with acid dyes.
12. Dyeing of silk and wool with metal complex dyes.
13. Practice on Shade Matching (self-shade).

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to

CO1 Effect of temperature, MLR, Electrolyte on dyeing of cotton
CO2 Dyeing of cotton with various dyes
CO3 Dyeing of wool and silk
CO4 Shade matching

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SEMESTER II

PDTP201 : TEXTILE TESTING & QUALITY CONTROL

	L	T	P	C
COURSE OBJECTIVES	4	0	0	4

To make the students understand about various testing of yarn and fabric.

Unit 1 INTRODUCTION OF TEXTILE TESTING 12

1. Objectives of textile testing.
2. Importance and Methods of Sampling.
3. Elements of Statistics, Measures of Dispersion.
4. Standard Atmospheric Conditions, Humidity and its effect on Textile Testing.
5. Determination of Moisture Regain & Moisture content.

Unit 2 INTRODUCTION OF COUNT & EVENNESS TESTER 12

1. Count Testing Methods viz. Analytical Balance, Knowle's Balance, Quadrant Balance, Beesley's Balance.
2. Evenness testing using visual Examination, Cutting & weighing and Electronic Capacitance Methods.
3. Factors affecting Yarn evenness its impact on fabric properties.

Unit 3 PRINCIPLE OF TWIST AND YARN STRENGTH TESTER 12

1. Yarn Twist and its effect on fabric properties.
2. Measurement of twist by Straightened Fibre Method.
3. Tensile Testing of Yarn-terms and definitions.
4. Principle of strength testing e.g. C.R.L., C.R.E. and C.R.T.
5. Lea strength and single Yarn Testing Machines.
6. Instron Strength Testing equipment.

Unit 4 INTRODUCTION OF FABRIC PHYSICAL TEST 12

1. Testing of fabric Strength Ballistic, Tear Bursting strength.
2. Testing of yarn strength Concept of C.S.P.& R.K.M.
3. Pilling tendency and its measurement using I.C.I. Pilling Test.
4. Measurement of abrasion resistance.

Unit 5 INTRODUCTION OF DIFFERENT TESTS & TEXTILE TESTING TERMINOLOGY 12

1. Measurement of Crease Recovery.
2. Measurement of Bending length.
3. Measurement of Thickness.
4. Measurement of Drape.
5. Concept of TQM and QC.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Objectives, elements of statistics & standard atmospheric condition for testing

CO2 Count and evenness testing methods

CO3 Twist, CRT, CRE, CRL and strength testing methods

CO4 Yarn and fabric strength testing, Measurement of pilling and abrasion resistance

CO5 Crease recovery, bending length, thickness and drape. Concept of TQM/ QC

TEXT BOOK

1 Booth J.E., “Principle of Textile Testing”, Butterworth Publications, London, 1989

2 Saville B.P., “Physical Testing of Textiles”, Textile Institute, Manchester, 1998

3 Kothari V. K., “Testing and Quality Management”, Progress in Textile Technology Vol.1, IAFL Publications, New Delhi, 1999

4 Textile Testing by Angappan

5 Textile Testing by NCUTE

REFERENCE BOOK

1 Ruth Clock and Grace Kunz., “Apparel Manufacture – Sewn Product Analysis”, Upper Sadle River Publications, New York, 2000

2 Pradip V. Mehta., “Managing Quality in the Apparel Industry”, NIFT Publication, India, 1998

3 Sara J. Kadolph., “Quality Assurance for Textiles and Apparels”, Fair child Publications, New York,1998

4 Slater K., “Physical Testing and Quality Control”, The Textile Institute, Vol.23, No.1/2/3 Manchester, 1993

5 Textile testing web course content https://nptel.ac.in/courses/116/102/116102029/#

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PDTP202 : SOFT SKILLS & PERSONALITY DEVELOPMENT

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To make the students understand to learn soft skills, personality development and managerial skills.

Unit 1 SOFT SKILL AND ETHICAL ISSUES IN MANAGEMENT 9

1. Introduction: Soft Skill, Ethics, Moral & Professional Skill.
2. Goal Setting, Life and Career Planning.
3. Human Perception: Understanding people.
4. Developing Potential and Self- Actualization, and Spiritual Intelligence.

Unit 2 INDIVIDUAL BEHAVIOUR AND STRATEGIC MANAGEMENT 9

1. SWOT-Analysis: Self-Assessment, Identifying Strength & Limitations.
2. Habits: Identifying Good and Bad Habits, Will-Power and Drives.
3. Developing Self-Esteem and Building Self-Confidence, Significance of Self-Discipline.
4. Attitudes, Types of Attitudes, Factors Affecting Attitudes.
5. Constructive Thinking Exploring & Managing Challenges.

Unit 3 PERSONALITY AND COMMUNICATION 9

1. Introduction to Personality: Personality Determinants, Theories in Personality.
2. Human Growth and Behaviour, Motivational Theory.
3. Communication Skills: Communicating Clearly, Understanding and Overcoming Barriers.
4. Intra Personal Communication and Body Language.
5. Inter Personal Communication and Relationship.

Unit 4 FUNDAMENTAL OF MANAGEMENT AND ENTREPRENEURSHIP 9

1. Management: Meaning, Nature and its Importance.
2. Leadership Skills: Introduction, Concept of Leadership, Qualities of a Good Leader.
3. Entrepreneurship Skill: Entrepreneurship Traits, Types of Entrepreneurs, Its Scope in Textile.
4. Team Management Skills: Concept, Team Management Techniques and its importance.
5. Role and Importance of Management in Handloom and Textile Industries.

Unit 5 SOCIAL MANAGEMENT 9

1. Critical Thinking and Problem Solving Skill, Mnemonic Techniques, Self Hypnotism.
2. Out of Box Thinking and Lateral Thinking Skill as a Tool of Creativity.
3. Life-long Learning and information Management Skill.

4. Stress Management: Type of Stress, Meditation and Concentration Techniques.
5. Presentation Skills: Preparation of Presentation, Project Reports and Resume.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Soft skill, goal setting and human perception
CO2 SWOT analysis, Habits, attitude and constructive thinking
CO3 Personality development, motivation & communication skills
CO4 Management, Leadership, Entrepreneurship, Team management skills and their importance
CO5 Critical thinking, presentation and information management skill, stress management

TEXT BOOK

1 Personality Development and Soft Skills, By Barun K. Mitra
2 Professional Ethics and Personality Development, By Nandini Srinivasan.
3 The ACE of Soft Skill, By Gopalaswamy Ramesh &Mohadeven Ramesh.
4 Communication Skills, By Sanjay Kumar &PuspaLata.
5 Management and Entrepreneurship in Indian Environment, By Vachaspati Mishra.

REFERENCE BOOK

1 Stress Management: A Comprehensive Guide to Wellness, By Edward A. Charlesworth and Ronold G. Nathan.
2 You Can Win: A Step by Step Tool for Top Achievers, By Shiv Khera

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PDTP203 : TECHNOLOGY OF DYEING-II

L	T	P	C
4	0	0	4

COURSE OBJECTIVES

To make the students understand the dyeing of synthetic fibres with their methods of dyeing and working principle of different dyeing machines, study of fastness properties.

Unit 1 DYEING OF POLYESTER 12

1. Brief description of Structural parameters of polyester making it difficult to dye.
2. Need, Principle, Methods of Heat setting Polyester & its effect on dyeing behavior.
3. Approaches for dyeing-Various methods of dyeing Polyester involving use of chemical and thermal energy.
4. Carrier dyeing and H.T.H.P. dyeing of polyester.

Unit 2 WORKING OF HTHP DYEING MACHINES 12

1. Brief description of parts and working of HTHP Beam dyeing machine, Jet Dyeing Machine, Soft Over Flow dyeing machines.

2. Thermosol method of dyeing polyester.
3. Outlines of the common defects and damages while dyeing polyester on above machines.

Unit 3 DYEING OF POLYAMIDES & ACRYLICS 12

1. Structural concepts of polyamides (Nylon6 and Nylon66) affecting their dyeing behavior.
2. Dyeing of Nylon with Disperse, Acid& Metal complex dyes.
3. Process details including time, temperature, pH and functions of chemicals used.
4. Structural concepts of Acrylic affecting their dyeing behavior.
5. Introduction to Method of Dyeing Acrylic with Cationic and Disperse dyes.

Unit 4 PROCESS SEQUENCE OF DIFFERENT BLENDS, FUNCTION OF AUXILIARIES AND INTRODUCTION OF GARMENT DYEING MACHINE. 12

1. Introduction and objectives of blending.
2. Process sequence of blended textiles comprising of P/C, P/V, Acrylic/Wool & P/W.
3. Function of Auxiliaries used in dyeing, viz. Levelling agents, exhausting agents, wetting agents, acid liberating agents, dispersing agents & Retarders.
4. Working of Garment dyeing machines.

Unit 5 INTRODUCTION TO COLOUR FASTNESS 12

1. Concept of fastness and grey scale.
2. Determination of Washing Fastness of Dyed materials.
3. Determination of Light Fastness of Dyed materials.
4. Determination of Rubbing Fastness of Dyed materials.
5. Determination of perspiration Fastness of Dyed materials.
6. Common defects observed in dyeing and their remedies.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Factors affecting polyester dyeing, heat setting and various method of dyeing polyester

CO2 Working of HTHP dyeing machines and their defects and damages

CO3 Polyamide and acrylic dyeing with different dyes

CO4 Process sequence of various blends, function of auxiliaries and garment dyeing m/c

CO5 Determination of various fastness and common defects in dyeing

TEXT BOOK

1 Technology of Dyeing –VI By Dr. V.A. Shenai

2 Processing of Polyester Cellulosic Blends ByVaidya&Trivedi.

3 Processing Synthetic Fibres By Datte & Vaidya.

4 Chemical Processing of Textiles By Dr. C.V. Koushik and Mr. Antao Irwin Josico.
5 Textile Chemical Processing Vol. I By Jitendra Kumar

REFERENCE BOOK

1 Processing Synthetic Fibres By Schmidlin.
2 Chemical Technology of Fibrous Materials By F. Sadov
3 The Chemistry of Dyeing By John K. Wood
4 Basic Principles of Textile Coloration By D. Broadbent

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PDTP 204 : TECHNOLOGY OF PRINTING-I

	L	T	P	C
COURSE OBJECTIVES	4	0	0	4

To make the students understand the about the Methods of Printing, preparation of blocks and Screens and Styles of printing ingredients used in printing paste.

Unit 1 INTRODUCTION TO TEXTILE PRINTING 12

1. Introduction to Printing.
2. Preparatory processes for Printing.
3. Introduction to Non-Mechanized and mechanized printing.
4. Design, Colour, Layout and repeat in printing textiles.

Unit 2 PREPARATION PROCESS OF BLOCK & SCREENS 12

1. Block making and working with blocks in printing textiles.
2. Principle of making hand screens.
3. Equipment and working with hand screens printing.
4. Preparation of Printing Screens.

Unit 3 WORKING OF PRINTING MACHINES 12

1. Advantages and disadvantages of blocks and screens.
2. Working of Semi-automatic, fully automatic flat bed screens printing machines
3. Working of rotary screen printing machine, making of rotary screens.
4. Advantages and disadvantages of the above printing machines.

Unit 4 INTRODUCTION TO STYLES OF PRINTING AND INGREDIENTS OF PRINTING PASTE WITH AFTER TREATMENTS OF PRINTED GOODS 12

1. Study of various ingredients used in print paste formulation.
2. Introduction to styles of printing, direct, discharge and resist.
3. After treatments of printed textiles viz. ageing, steaming and curing.
4. Introduction to pigment printing and function of various ingredients.

Unit 5 PRINTING OF COTTON WITH SYNTHETIC AND NATURAL DYES. 12

1. Direct style printing of cotton with direct dyes, reactive dyes and pigments.
2. Advantages and disadvantages of pigment printing.
3. Natural dyes used in printing, its limitations and advantages over synthetic dyes.
4. Printing with Natural dyes.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Printing and preparatory processes, terms used in printing

CO2 Block and screen printing by hand

CO3 Working of various printing machines with its advantages and disadvantages

CO4 Printing Styles, after treatments, Print paste formulation and pigment printing

CO5 Direct style printing of cotton by various dyes, merits and demerits of pigment printing

TEXT BOOK

1 Technology of printing by V.A. Shenai

2 Textile Printing By D.G. Kale

3 Textile Printing by R. S. Prayag

REFERENCE BOOK

1 Handbook of Textile processing machinery – R.S. Bhagwat1999

2 An Introduction to Textile printing by W Clarke.

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PDTP205 : TEXTILE TESTING PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	6	3

Testing of yarn and fabric with evaluation of fastness properties.

LIST OF PRACTICALS /ACTIVITIES

1. Determination of count of yarn by Beesley's/Knowles/Quadrant Balances.
2. Determination of count of yarn by using Wrap reel and Physical Balance.
3. Assessment of yarn evenness using visual assessment instruments.
4. Determining the yarn twist on yarn twist testers.
5. Determination of yarn strength by using lea strength tester.
6. Determination of fabric tensile strength by tensile strength tester.
7. Assessment of pilling property by using pilling boxes.
8. Determining crease recovery property of fabric by creasing testers.
9. Determining fabric thickness by thickness gauge.
10. Assessment of abrasion resistance.
11. Determination of class of dye on coloured textile material/dyestuff power.
12. Assessment of washing fastness by ISO-I, II, III, IV & V.
13. Assessment of rubbing fastness of dyed fabric by using Crock meter.
14. Assessment of Sublimation fastness of dyed fabric.
15. Assessment of light fastness of coloured textiles using light fastness tester.
16. Assessment of perspiration fastness of dyed fabric

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Yarn count and yarn evenness/ twist

CO2 Yarn and fabric strength, pilling and crease recovery

CO3 Fabric thickness, abrasion resistance and class of dye on fabric

CO4 Various fastness properties

-

PDTP206 : TEXTILE DYEING PRACTICE-II

	L	T	P	C
COURSE OBJECTIVES	0	1	2	3

Preparatory process of synthetic fibres and their dyeing with different dyes.

LIST OF PRACTICALS /ACTIVITIES

1. Scouring and bleaching of Polyester.
2. Scouring and bleaching of Nylon.
3. Scouring and bleaching of Acrylic.
4. Dyeing of Polyester with Disperse dyes by carrier method.
5. Dyeing of polyester with Disperse-dyes by HTHP method.
6. Dyeing of P/C with disperse and Vat/reactive dyes (solid/cross/reserve shades).
7. Dyeing of nylon with acid dyes and metal complex dyes.
8. Dyeing of nylon with disperse dyes.
9. Dyeing of acrylics with cationic dyes.
10. Dyeing of acrylics with disperse dyes.
11. Practice of shade matching (compound shades).

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Scouring and bleaching of synthetic fibres

CO2 Dyeing of polyester and P/C Blend in various combinations

CO3 Dyeing of nylon and acrylic

CO4 Shade matching

-

PDTP207 : COMPUTER COLOUR MATCHING PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	3	1.5

Study of various modules of CCM

LIST OF PRACTICALS /ACTIVITIES

1. Calibration of spectrophotometer.
2. Colour specification (L, a, b, C, H) analysis for the given samples.
3. K/S Data Generation for the dyed/printed sample.
4. Prediction of recipe for the dyed/printed sample using CCM
5. Batch Correction of the dyed sample using CCM..
6. Measurement of delta-E / Matching of shades of the given samples.

7. Pass Fail, Shade sorting & Library.
8. Cost analysis of different recipes using CCM.
9. Metamerism Analysis of different recipes using CCM.
10. Fastness Assessment using CCM.
11. Comparison of fastness assessment between manual and CCM .
12. Whiteness index measurement of given white samples.
13. Yellowness measurement of given white samples

Total: 30 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Spectrophotometer and its calibration, Colour specification(L,a,b, C, H)
CO2 K/S data, recipe prediction and batch correction
CO3 Pass-Fail analysis, cost analysis and metamerism
CO4 Fastness assessment, whiteness and yellowness index

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SEMESTER III

PDTP301 : TECHNOLOGY OF PRINTING-II

	L	T	P	C
COURSE OBJECTIVES	4	0	0	4

To make the students understand about the Styles of Printing, methods of cotton, silk and polyester printing. Study of traditional methods of printing.

Unit 1 INTRODUCTION OF STYLES OF PRINTING 12

1. Introduction and Chemistry involved in discharge and resist style of printing.
2. Study of various discharging agents.
3. Methods of producing white and colour discharge effects on cotton dyed with vat, reactive and azoic colours.

Unit 2 PRINTING OF SILK 12

1. Methods and process sequences of printing with acid& metal complex dye on silk
2. Methods of producing white and colour discharge effects on silk.

Unit 3 PRINTING OF POLYESTER 12

1. Methods of printing polyester with disperse dyes by direct and discharge style of printing.
2. Methods of printing polyesters/cotton blends with pigments.

Unit 4 INTRODUCTION TO ADVANCE METHOD OF TEXTILE PRINTING 12

1. Transfer printing and various machines used in transfer printing on textiles & its limitations.
2. Digital printing – Chemistry and technology, study of various ink-jet system and its merits & demerits.
3. Printing of knitted garments.

Unit 5 Introduction to Traditional Styles of Printing 12

1. Kalamkari
2.Batik
3.Tie& Dye (Bandhani)
4.Ajrakh Printing
5.Bagru printing &Sanganeri Print
6.Khadi (White & Colored)
7.Flock printing

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Printing by discharge style on cotton
CO2 Direct and Discharge Printing of silk
CO3 Printing of polyester with disperse dyes and P/C blend with pigments
CO4 Transfer printing and Digital printing, printing of knitted goods
CO5 Traditional styles of printing

TEXT BOOK

1 Technology of printing –R.S.Prayag
2 Textile Printing-Prof.D.G.Kale
3 Technology of printing-Dr. V.A.Shenai
4 Digital Textile Printing by Susan Carden

REFERENCE BOOK

1 An introduction to Textile printing-W.Clark
2 Basic Principles of Textile Colouration-A.D.broadbent
3 Textile printing-By Leslie WC Miles

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PDTP302 : TECHNOLOGY OF FINISHING

	L	T	P	C
COURSE OBJECTIVES	4	0	0	4

To make the students understand the about the textile finishing application of different finishing chemicals and their effects.

Unit 1 INTRODUCTION TO TEXTILE FINISHING 12

1. Commercial importance of finishing and its classification.
2. Resin finishing: Mechanism of creasing, Types of Resins.
3. Anti crease, wash and wear, durable press resin finishing.
4. Mercerization and structural changes taking place in mercerization.
5. Yarn and fabric mercerizing machines.
6. Liquor ammonia mercerization

Unit 2 INTRODUCTION TO FUNCTIONAL FINISHES 12

PART-1

1. Concept of Flame proof & flame retardancy.

2. Concept of pyrolysis, Flame retardant finishes for cotton, Concept of waterproof and water repellent Finishes, Mildew proof finishes and Rot proof finishing.
3. Durable & temporary finishes, Antimicrobial, Aroma finish, UV Protection finishes, Bio-polishing.

Unit 3 INTRODUCTION TO FUNCTIONAL FINISHES PART-2 12

1. Soil Release Finishing: Mechanism of soil retention.
2. Various soil releases finishes for cotton, Polyester and its blends.
3. Detail study of antistatic finishes.
4. Anti pilling Finishing

Unit 4 INTRODUCTION TO MECHANICAL, FOAM FINISH & HEAT SETTING 12

1. Detail study about mechanical finishing of textile materials like Calendaring, Raising, Sanforising, Peach finishing.
2. Object of Heat setting.
3. Various methods of heat setting and mechanism of heat setting.
4. Foam Finishing: Detailed study of various techniques of foam application.
5. Drawbacks of foam finishing.

Unit 5 INTRODUCTION OF ADVANCE FINISHING OF POLYESTER AND SOFTENERS 12

1. Mechanism in the weight reduction of PET by using alkali: Micro encapsulation techniques in finishing process.
2. Study about cationic, reactive and silicon emulsion softeners.
3. Introduction to Nano Finishing.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Finishing and its classification, Anti crease finishing & mercerization
CO2 Flame proof & flame retardant finish, water proof & water repellent finish & other functional finish
CO3 Soil release, anti static and anti pilling finishes
CO4 Various mechanical finishes, heat setting and foam finishing
CO5 Advance finishing techniques and types of softeners

TEXT BOOK

1 Technology of finishing by V.A.Shenai
2 Technology of finishing by R.S. Prayag
3 Textile finishing by A.J.Hall
4 Handbook of textile processing machineries by R.S.Bhagwat

REFERENCE BOOK

1 Textile – Reference –Book-For-Finishing By Pietro Bellini, FerruccioBonetti,

Easter-Franzetti.
2 The Finishing Textile Fabric (Woolen, Worsted & Others Cloth) By Roberts Beasumount.
3 Textile Fibers, Dyes, Finishes and Processes by Howard L. Needles.
4 Chemistry & Technology of Fabric Preparation & Finishing By Dr. Charles Tomasino.
5 Chemistry Technology of Fibrous Materials by F. Sadov.

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PDTP303 : CHEMISTRY OF INTERMEDIATES & DYES

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To make the students understand about the Historical importance of natural dyes, Chemistry of dyes and intermediates and process of synthetic dyes.

Unit 1 INTRODUCTION OF DYES 9

1. A brief introduction of natural and synthetic dyes.
2. Raw materials and coaltar distillation.
3. Unit process in organic synthesis such as Halogenation, Nitration, Sulphonation, Esterification, Hydrogenation and Diazotisation with suitable examples.

Unit 2 INTRODUCTION TO CLASSIFICATION OF SYNTHETIC DYES. 9

1. Classification of dyes on the basis of their chemical structure such as azines, oxazines, xanthenes, acridines, thiozols, quinolines,cynanines, diphenyl and triphenyl methane dyes,azo dyes, nitro and nitroso dyes.
2. Relationship between dye structure, application and dye fibre interaction.

Unit 3 INTRODUCTION TO CHEMISTRY OF DYES 9

1. Chemistry of anthraquinone vat dyes, indigoid and thioindigoid dyes, solubilised vat dyes, sulphurcolours, reactive dyes, disperse dyes and Fluorescent Brightening agents.

Unit 4 INTRODUCTION TO CHEMISTRY OF DYES INTERMEDIATES 9

1. Study of important intermediates from Benzene, Indanthrene, Chlorobenzene, nitro benzene, aniline, phenol and salicylic acid, Naphthalene and anthracene.
2. Chemical structure of H-Acid and BON Acid.

Unit 5 SYNTHESIS OF DIFFERENT DYES 9

1. Preparation of each dye :Napthol AS, Indigotin, Fast Red TR base, Rhodamine B, Auromine, Methylene Blue, Alizarine, Caledon Jade Green, Indanthrene Blue.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Natural & synthetic dyes, raw materials and various unit processes in synthesis of dyes

CO2 Classification of dyes based on chemical structure and dye fibre interaction

CO3 Chemistry of dyes

CO4 Chemistry of dye intermediates

CO5 Preparation of dyes

TEXT BOOK

1 Synthetic Dyes by Gurdeep R. Chatwal

2 Chemistry of Synthetic Dyes Vol. I-VIII by Venkatraman

3 Chemistry of dyes and principle of dyeing by V.A. Shenai

4 Handbook of Synthetic Dyes & Pigments by K.M. Shah

REFERENCE BOOK

1 Colorant and Auxiliaries Volume _ 1 Colorants by John Shore

2 Colorant and Auxiliaries Volume _ 2 Colorants by John Shore

3 Textile Dyes by Mansoor Iqbal

4 Industrial Dyes Chemistry, Properties, Application by K. Humnger

5 Text Book of Dyes by M.G. Arora

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PDTP304 : ECOLOGY& POLLUTION CONTROL IN TEXTILE INDUSTRY

	L	T	P	C
COURSE OBJECTIVES	3	0	0	3

To make the students understand about the importance of ecological system and different types of pollution in textile industry.

Unit 1 INTRODUCTION OF ENVIRONMENT AND POLLUTION 9

1. Environment, Types-Natural and manmade Environment, Components of Environment, Segments of Environment, Atmosphere.
2. Pollution, Types of Pollution viz. Air, Water, Soil, Noise and Thermal pollution.
3. Overview of environmental pollution in Textile Industries.
4. Environmental pollution & its harmful effects on human beings, vegetation inert material and physical features of atmosphere.
5. Pollutants, Types, Brief description on pollutants in Textiles.

Unit 2 TYPES OF POLLUTION 9

1. Air Pollution-Definition, causes of Air Pollution.
2. Classification, Sources & Characteristics of important Air Pollutants.
3. Sources of Air Pollution in a Textile mill.
4. Air Quality Standards.
5. Indoor and outdoor air pollution.
6. Study of Harmful Chemicals used in Textile Industry.

Unit 3 INTRODUCTION OF WATER POLLUTION & PARAMETERS 9

1. Water Pollution-Definition and Classification.
2. Various sources of waste water in wet processing.
3. Characteristics of waste water –SS, TDS, DO, COD, BOD.
4. Textile waste water problems, Chemical recovery and reuse.
5. Water conservation in Textile Industry.
6. Impact of water pollution on man, marine life & ecology of textiles.

Unit 4 INTRODUCTION OF WATER EFFLUENT TREATMENTS 9

1. Methods of wastewater/Effluent treatment i.e. physical, chemical and biological treatment.
2. Brief description of design and working of effluent treatment plant.
3. Methods of Textile dyes house waste water decolourization and removal of organic pollutants.
4. Tolerance level of effluents in wet processing of textiles.
5. Solid wastes, its sources, various methods of waste reduction.
6. Sludge treatment and solid waste disposal of textile Industry.

Unit 5 NOISE POLLUTION AND ECO-STANDARDS 9

1. Noise Pollution-Definition and harmful effects.
2. Preventive & control of noise pollution in Textile Industry.
3. Noise Pollution parameters.
4. New Challenges towards achievements of strict standards in Textile processing effluents.
5. Eco-standards and Eco-labels for textiles.
6. ISO 14000 & current environment policies related to Textiles Industry.

Total: 45 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Environment, types of pollution and their harmful effects, types of pollutants
CO2 Air pollution-classification, sources and AQS
CO3 Water pollution-classification, sources and characteristics of waste water
CO4 ETP, Tolerance level of effluents, solid waste reduction and disposal
CO5 Noise pollution, its parameters, eco standards & eco labels, ISO 14000

TEXT BOOK

1 Text book of Environmental Chemistry & Pollution Control by SS Dara
2 Sewage Disposal & Air Pollution Engineering by S.K.Garg
3 Pollution Control in Textile Industry by S.C. Bhatia, Sarvesh Devraj
4 Environment Pollution and Environmental by Padmanabh Dwivedi

REFERENCE BOOK

1 Environment Chemistry by A.K.DE

2 Perspectives in Environmental Studies by AnubhaC.P.Kaushik-Kaushik
3 Waste water Treatment by M.N.Rao. A.K.Datta
4 Air Pollution M N Rao and H V N Rao
5 A text book of Environmental Studies byTangamani & Shymala Thangamni
6 Workshop on Environment Pollution & Control in Textile Industry by BTRA

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PDTP305 : PROJECT WORK

	L	T	P	C
COURSE OBJECTIVES	0	0	6	3

To make the students understand about the practical analysis of industrial and laboratory practices to develop their practical knowledge and skill.

LIST OF PRACTICALS /ACTIVITIES

- Each student is required to submit a project report on a given topic.
- The Project may be carried out in the laboratory of the institute or preferably in a process house under actual working condition.
- The principle object of the project work is to develop the analysis skills & facilitation solutions of the day to day issues at shop floor level.
- This will also test the ability of the student to co-ordinate knowledge with the actual production activities.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Understand the practical activities in textile industry and develop innovation attitude in further application of study/practices.

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PDTP306 : TEXTILE FINISHING PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	6	3

To make the students understand about the practices on following practical on different finishes on textile material.

LIST OF PRACTICALS /ACTIVITIES

1. Stiff finishing of given fabric using Starch/PVA
2. Soft finishing of given fabric using softener (Anionic/Cationic/Non-ionic/Reactive)
3. Buckram/back filling finish for the given fabric sample using a suitable recipe.
4. Producing of water repellent finish to the given fabric sample.
5. Application of Crease recovery finishing in given Cotton/Polyester-Cotton fabric.
6. Applications of Weight reduction finish on given polyester material.
7. Carbonisation of given P/C blends.
8. Producing of Scroopy finishing effect on silk fabric.
9. Application of Flame retardant finish to the given sample.

10. Application of Anti-microbial finish to the given sample.
11. Applications of stain release finish on the given sample.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Soft and stiff finishing of cotton
CO2 Water repellent, crease recovery and weight reduction finish
CO3 Carbonisation and scroop finish
CO4 Application of functional finishes

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PDTP307– TEXTILE PRINTING PRACTICE

	L	T	P	C
COURSE OBJECTIVES	0	0	6	3

To make the students understand about the practices on textile printing practical by using different dyes and styles on textile materials.

LIST OF PRACTICALS /ACTIVITIES

1. Printing of cotton cloth in direct style with direct colours.
2. Printing of cotton cloth in direct style with reactive colours.
3. Printing of cotton cloth in direct style with pigments colours.
4. Printing in batik style in cotton fabric.
5. Printing in bandhage/Tie & dye style on cotton fabric.
6. Printing of silk with Acid dyes in direct style.
7. Printing of silk with Metal complex dyes in direct style.
8. Printing of polyester with Disperse dyes in direct style.
9. Printing of polyester with pigments in direct style.
10. Printing of polyester/cotton blend with pigments in direct style.
11. Discharge printing of cotton fabric with vat colours on direct dyed ground.
12. Discharge printing of cotton fabric with vat colours on reactive dyed ground.
13. Discharge printing of polyester.

Total: 60 Hour

COURSE OUTCOMES

At the end of the study of this course, the students will be able to learn

CO1 Cotton printing with direct, reactive and pigment
CO2 Traditional styles of printing cotton
CO3 Silk printing with acid/ metal complex dyes
CO4 Polyester printing with disperse dyes and pigments
CO5 Discharge printing of cotton and polyester

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DHTT & PDTP

Examination Rules & Regulations

EXAMINATION RULES FOR THE DIPOLMA AND POST DIPLOMA PROGRAMMES (REGULATION – 2021)

These Rules are framed by Board of Academic Affairs of IIHT.

These rules are called as "**Diploma and Post Diploma Examination Rules**".

These Rules will become effective from the academic year 2021-22 Applicable to students admitted to First Year Diploma in Handloom and Textile Technology (DHTT) and Post Diploma in Textile Processing in the academic year 2021-22 and succeeding academic years

1. INTRODUCTION

1.1. The rules here under shall be called the Examination Rules for the Indian Institutes of Handloom Technology (IIHTs) functioning under both central and state Government

1.2. The rules will be applicable to the students admitted/readmitted to Diploma and Post Diploma programmes in all IIHTs in the academic year 2021-22 and succeeding academic year.

1.3. These rules supersede all previous rules unless and otherwise explicitly mentioned and will be in force till the next revision.

1.4. These rules will be subject to amendment by the Board of Academic Affairs (BOAA) as and when necessary.

2. TITLE, ABBREVIATIONS AND NOMENCLATURES

2.1. **DC(H)** – Development Commissioner (Handlooms)

2.2. **BoAA** – Board of Academic Affairs

2.3. **HoO** – Head of Office

2.4. **Sub- Committee I of BoAA**

A Committee that Comprises of Director / Principal / HoOs of all IIHTs and exam cell coordinator as member. The Chairman and Convenor of BoAA shall be the Chairman and Chairman respectively.

2.5. **Sub- Committee II**

The Chairman and Convenor of BoAA shall be the Chairman and Convenor respectively for this committee also. In addition to this one

director / Principal/HoO of State sector and one director / Principal/HoO of central sector IIHTs shall be nominated during the preceding sub-committee I meeting to represent the respective sector IIHTs and exam cell coordinator member.

2.6. **ECC**- Examination Cell Coordinator

2.7. **EC** – Examination cell

2.8. **IIHT** – Indian Institute of Handloom Technology

3. POWERS AND RESPONSIBLITIES

3.1. Powers of the BOAA

The **BOAA** of the **IIHT** is the executive body for formulation and implementation of Academic Policy matters. It has the power to frame Guidelines and issue Directions / Instructions for conducting the examinations effectively in a fair manner. The BOAA will suggest the number of instructional days and the period of examination considering the norms of AICTE and recommend the fee & other charges payable by the students for the examinations.

The BOAA is authorized

a) To make regulations for the conduct of examinations
b) To suggest the pattern of questions for various courses
c) To suggest methodologies for innovative evaluation techniques
d) To suggest pattern of questions for continuous assessment and end semester examination.

3.2. Responsibilities of the Convenor

The Convenor shall be appointed by the DC Handlooms (Chairman Governing Body).

The responsibilities of the Convenor are;

3.2.1 Convenor shall be responsible for the scheduling, preparation and conduct of all examinations of the IIHTs.

3.2.2 It shall be the duty of the Convenor to ensure that the provisions of the regulatory bodies (AICTE / University Grants Commission)

are implemented in matters relating to academic activities and conduct of examination.

3.2.3 The Convenor or any faculty members of IIHT deputed by Chairman shall have the right to visit and inspect the examination related activity in any IIHT at any time during the conduct of examination.

3.2.4 Convenor shall have the responsibility and power to provide enough man power in consultation with headquarter for the timely completion of work related to the conduct of examinations, evaluation and publication of results.

3.2.5 The Convenor shall have the power to convene meetings of BoAA and its sub-committees in consultation with the Chairman of BoAA to discuss matters related to the academic activities and resolve to take appropriate decisions on the matters. He is also responsible for conduct of examinations and publication of results in consultations with the Chairman of BoAA.

3.3. Duties and responsibilities of the Exam Cell and Exam Cell Coordinator

The Exam cell of IIHT is the central office coordinating the entire exam related activities of all 10 IIHTs. The exam cell (EC) shall function under the directions of the Convenor. The Exam Cell coordinator (ECC) shall be appointed by the Convenor by identifying a suitable person from the group of senior faculty members, where the exam cell is functioning.

The ECC shall perform his/her duties in addition to his/her regular academic activities assigned by the Director / HoO of respective IIHT. However, while assigning academic responsibilities to the ECC the Director shall consider the workload of EC on preferential basis. There shall be a team of Office Assistants, Computer Programmers, Data Entry Operators and other assistants in the EC Office. The EC office shall have appropriate infrastructure for preparing question papers and other relevant confidential materials.

All part-time/full time functionaries of the Examination Cell shall be paid honorarium for the extra work being done by them apart from their usual work as per the guidelines issued by DC (H) from time to time.

3.4. **Responsibilities of Exam Cell Co-ordinator**

The Exam Cell Co-ordinator shall perform the following duties under the guidance of BoAA Convenor and Chairman as the case may be: -

3.4.1 Preparation of examination schedule.

3.4.2 Creation of data-base of students admitted to IIHT and maintenance of the data base.

3.4.3 Admit eligible candidates to various examinations as per relevant rules prescribed by BoAA.

3.4.4 Collecting fees for all examinations as per the extant rules issued from time to time by DC (H).

3.4.5 Keep accounts of the fees collected and expenses towards conduct of examination (paper setting, valuation and practical / viva-voce examination, stationeries, etc.) conduct of meetings etc.

3.4.6 Executing the work related to conduct of examinations, evaluation and declaration of results as per the direction of Convenor.

3.4.7 Assisting the Convenor to convene the meetings of sub-committee I and sub-committee II of BOAA and maintain the minutes of the meeting.

3.4.8 To maintain and update EMS portal and issue provisional certificate, consolidated mark sheets of all students.

3.4.9 Print and issue of semester exam Mark Sheet / Grade Sheets to the candidates through Directors of respective IIHT.

3.4.10 Enforce disciplinary action against the candidates, to whom the punishment was awarded by the Disciplinary Committee for violation of examination rules.

3.4.11 Taking decisions on all routine matters related to examination in consultation with Convenor.

3.4.12 Making necessary arrangements for the safe custody of files connected with the conduct of examinations, documents, certificates etc.

3.4.13 Taking special care on secrecy and confidentiality of all the matters connected to examination activities.

3.4.14 To ensure the Payment of remuneration and allowances to question paper setters, examiners and BoAA members as per extant rules.

3.4.15 Taking quick decisions as circumstances warrant and inform Convenor of such decision promptly.

3.4.16 Exercising control over the space allotted for the examination hall including that for centralized activities. Further, he / she should ensure that the ECC office, stores etc. are properly maintained and restrict entry of persons to the exam cell to maintain the confidentiality.

3.4.17 Perform such other duties as may be allotted by the Convenor / BOAA from time to time

3.4.18 The EC office staff shall function under his / her direct supervision

3.5. **Responsibilities of Sub Committee I of BoAA**

The Sub - Committee I of BoAA shall consist of the Chairman, Convenor, Directors of all IIHTs and Exam Cell Coordinator.

The following are the functions of the Sub – Committee I of BoAA

3.5.1 To schedule the examination, scrutiny of question paper and their printing and distributing to Director / HoO of all IIHTs

3.5.2 To take policy decision in respect of routine academic activities and conduct of examinations.

3.5.3 Convenor shall call for a meeting of the Sub - committee I in consultation with Chairman.

3.6. **Responsibilities of Sub-Committee II**

The **Sub-Committee II** shall consist of

The Chairman and Convenor of BoAA shall be the Chairman and Convenor respectively for this committee also. In addition to this one director / Principal / HoO of State sector and one director / Principal / HoO of central sector IIHTs shall be nominated during the preceding sub-committee I meeting to represent the respective sector IIHTs

After Reviewing the result papers of semester exam marks, the Sub Committee II shall suggest suitable moderation of marks, if any, required for the course(s) depending on difficulty levels expressed by the Director/(s) and other members.

4. IMPORTANT POINTS TO BE OBSERVED

4.1. Eligibility for Appearing in the Examinations

4.1.1 The minimum percentage of attendance (in all years) required for a candidate to become eligible to write the examination is 75%. No further condonation of attendance shall be allowed.

4.1.2 A candidate to become eligible for appearing in the examination must satisfactorily complete all the specified laboratory practical & project work as prescribed in the curriculum for the particular academic year.

4.1.3 A candidate to become eligible for appearing in the examination, must deposit the prescribed examination fees through the Head of Institute. It shall be the responsibility of the candidate to ensure timely deposit of examination fees.

4.2. Fee for Examination

4.2.1 A candidate intending to appear for the examination shall remit the prescribed fee per Semester through the Head (Director) of the respective Institute. It shall be the responsibility of the candidate to ensure timely remittance of examination fee.

4.2.2 Rs. 100 per course shall be collected as fee for examination. (i.e the number of courses including practical multiplied by 100). However, the fee is subject to revision by the Competent Authority from time to time and the candidate has to pay the amount as per the prevailing rate at that time.

4.2.3 The students who have back papers, must remit the exam fee for all their back papers

4.2.4 Fees once paid shall not be refunded.

4.2.5 Time Schedule for remittance of Examination fee.

- The candidate shall pay examination fee on or before the due date for payment set by the respective Director / Principal / HoO
- Exam fee notification shall be issued by Exam Cell tentatively during the 4th Week of every January and August for Apr/May Exam and Nov/Dec Exam respectively.

(No separate communication will be sent to failed candidates for remittance of examination fees.)

4.3. **Attendance and Debarment**

4.3.1 **The candidate shall be debarred from writing the semester examination if he/she fails to get the minimum attendance percentage as mentioned in 4.1.1 and required to repeat the same semester in the next academic year.**

4.3.2 A candidate shall not be permitted to attend the higher semester, if he/she did not appear in at least any one of the examination papers in the previous semester due to shortage of attendance

4.3.3 A candidate debarred (Not permitted) for appearing in the examination due to shortage of attendance shall repeat the study of same semester courses again. While paying stipend to the student during repeat semester, it shall be ensured that the total stipend paid for studying that semester including the repeat semester shall not be in excess of his eligibility of stipend per semester. **Repeat of year/Semester will be allowed more than one time also. However, the students have to complete the program within the maximum period of 05 years from the date of admission.**

4.3.4 Any Candidate who could not complete the Diploma program within the prescribed time limit of 05 years shall forfeit the Diploma.

4.4. **Medium of Instruction & Examination**

English will be the medium of Instruction for Diploma and post Diploma programme. The candidates appearing for examination shall have to write and communicate answers to the questions in written or oral examination through the medium of English language only.

4.5. **Frequency of Examination**

Examinations shall be conducted twice in a year. i.e Odd semester during the month of Nov-Dec and even semester during the month of April-May

The Examination schedules (dates) shall be announced by the Subcommittee – I of Board of Academic Affairs. On specific occasions, the exam dates will be announced by the Convenor of the Board of Academic Affairs in consultation with chairman of BOAA.

4.6. **Centre of Examination**

Students from each Institute shall attend examination in the respective Institute only. No change of centre of examination shall be allowed.

4.6.1 Examination shall be held simultaneously in all the Institutes.

4.6.2 If the examination could not be held in any Institute for reasons what soever, the said examination of that particular Institute shall be treated as null and void. Any further action in this regard as deemed fit shall be taken by the Convenor of Board of Academic Affairs in Consultation with the Chairman of BOAA.

4.7. **Hall Tickets (Admit Card)**

4.7.1 Hall tickets shall be issued to all the eligible candidates who have registered for the examination on payment of the prescribed examination fees within the permitted time limit. The Hall Tickets

shall not be issued to the candidates who do not have the minimum required percentage of attendance in the current Semester. However, in respect of arrear exams (Back papers) the hall tickets will be issued to the students even if they have attendance shortage in the current semester.

4.7.2 No candidate shall be permitted to write the examination without a valid hall ticket.

4.7.3 If a candidate had lost the hall ticket, a duplicate hall ticket shall be issued on payment of Rs.50/-.

5. EVALUATION SYSTEM

All courses included under Curriculum of Regulation 2021 shall be evaluated by Continuous Assessment System except the Audit courses. There is no evaluation for Audit course. However, minimum attendance requirement shall be satisfied by the candidate in the audit course for the award of Diploma. The following criteria will be followed to arrive at the overall marks for a theory course. Each course shall be evaluated for the maximum of 100 marks

Sl. No	Category of the course	Internal Assessment marks	End - Semester examination marks	Total
1	Theory Course	40	60	100
2	Laboratory course	60	40	100
3	Project (both mini project and Major project)/ Internship / Seminar	60 (Periodical report - 20 Work done - 20 Quality of work – 20)	40 (Presentation - 20 Viva - Voce - 20)	100

Every teacher is required to maintain an ‘ATTENDANCE AND ASSESSMENT RECORD’ for every semester which consists of attendance marked in each theory / Laboratory / Project, the assessment marks and the record of class work (topics covered). The faculty member shall maintain the attendance and assessment record separately for each course handled by him/her. This shall be submitted to the

Director / Head of Office / Principal periodically (at least three times in a semester) for checking the syllabus coverage and the records of assessment marks and attendance. The Director / Head of Office / Principal will affix his/her signature and date after due verification. At the end of the semester, the record should be submitted to the Director / Head of Office / Principal, who shall keep this document in safe custody (for five years). The records of attendance and assessment of both current and previous semesters should be available for inspection

5.1. **Internal Assessment mark**

The internal mark to be awarded for theory course is 40, giving weightage to three periodical tests, different assignments and attendance. A suggestive plan is given below and the director may modify the assignment's structure according to the course type, without changing the tests and attendance marks.

<table>
<tr><th colspan="5">INTERNAL ASSESSMENT STRUCTURE (IAS)</th></tr>
<tr><th>Details</th><th>Cycle</th><th>Content/Model/Portion*</th><th>Marks</th><th>IA</th></tr>
<tr><td rowspan="3">Centralised Periodical Test (CPT)</td><td>CPT 1</td><td>After completing 30% of the Syllabus and Classes.</td><td>15</td><td rowspan="3">Best 2 (30)</td></tr>
<tr><td>CPT 2</td><td>After completing 65% of the Syllabus and Classes.*</td><td>15</td></tr>
<tr><td>CPT 3</td><td>After completing 100% of the Syllabus and Classes.*</td><td>15</td></tr>
<tr><td rowspan="4">Periodical Assignments (PA)</td><td>PA-1</td><td>Individual Activity - (Written or typed submission)</td><td>2</td><td rowspan="4">Best 3 (06)</td></tr>
<tr><td>PA-2</td><td>Individual Activity - (Written or typed submission)</td><td>2</td></tr>
<tr><td>PA-3</td><td>Group Activity - (PowerPoint presentation)</td><td>2</td></tr>
<tr><td>PA-4</td><td>Group Activity - (PowerPoint presentation)</td><td>2</td></tr>
<tr><td rowspan="5">Course Attendance</td><td rowspan="5">Average attendance percentage in the course</td><td>90 and above</td><td>4</td><td rowspan="5">Highest (04)</td></tr>
<tr><td>85 – 89</td><td>3</td></tr>
<tr><td>80 – 84</td><td>2</td></tr>
<tr><td>79 -75</td><td>1</td></tr>
<tr><td><75</td><td>0</td></tr>
<tr><td colspan="3">Total Internal Marks</td><td>40</td></tr>
</table>

* Previous test portion, will not be repeated for the test

5.2. **End- Semester Examination marks**

The end - semester examination marks in each theory course shall be 100 marks. Further, it will be converted to 60 marks.

5.3. **Criteria to declare pass in each course**

To Secure pass in any course, a student shall obtain a minimum of 35% of marks in the end - Semester Examination in each course and at least 40% marks in aggregate, i.e End - Semester Examination marks and Internal Assessment marks put together.

5.3.1 A student obtaining less than 35% marks in one course in the Semester Examination. But obtaining 40% marks in aggregate of Semester and Internal Examination marks put together shall be declared as **FAIL** in that course. (Refer Sl .No 2 of the following Table)

5.3.2 However, there is no minimum marks requirement in the case of internal assessment. (Refer Sl .No 3 of the following Table)

Sl. No	Name of the course	Internal Assessment marks (maximum 40)	End - Semester examination Marks (Maximum 60)	Total (Maximum 100)	Result
1	X	16	24	40	PASS
2	Y	20	20	43	*FAIL
3	Z	0	40	40	PASS

*****Though the student has secured 40% in aggregate the result is declared as **FAIL** in the course as the mark in the Semester Examination is less than 35%

5.4. **Grace Marks for Courses Passing**

A maximum of 03 marks shall be added in any one course if the result of the candidate gets changed from Fail to Pass. The change will be recorded in the minutes of the meeting of Sub-Committee - II of BOAA along with their name, Register No. and Institute Name. The grace

mark will be directly added to the marks scored by the candidate in a particular failed course without any indication.

6. ELIGIBILITY TO CONTINUE IN THE NEXT HIGHER SEMESTER / YEAR

Run-through system is in force for the Diploma / Post Diploma Courses in the Regulation 2014 in which the students are being permitted to continue their studies in the next higher semester even if they do not pass in the lower semester examinations. But,

6.1. A student with enough attendance in a particular semester and who had registered himself / herself for the semester Examination by paying the fee on time and received the hall ticket has to necessarily appear for the semester Examination in atleast one paper (Either Theory or Practical) of the concerned regular semester / (not in back paper of previous semester / year) in which he / she is studying to become eligible to continue his / her studies in the next semester, in the institution.

6.2. A regular candidate who had received the Hall Ticket, but not appeared for exam even in anyone course (Irrespective of Theory and Practical) of the Examination of the current semester, shall not be permitted either to continue his / her studies in the next semester or to appear for the papers as arrears in the subsequent examinations. He / She will be considered as a discontinued candidate. Such candidates have to be re-admitted in the same semester in the next academic year and satisfy all the prescribed requirements with respect to attendance, payment of fees etc. to become eligible to write the Examinations.

7. CLASSIFICATION OF SUCCESSFUL CANDIDATES

A student admitted under the new Regulation R2021 shall be awarded Diploma certificates with the following category on successful completion of all the examinations.

7.1. **Grading**

The following different grade systems shall be awarded based on the following criteria

Grading	Marks Percentage
First Class with Distinction	A Pass in all courses with average marks of 80% and above.
First Class	A Pass in all courses with average marks of 60% and above.
Second Class	A Pass in all courses with average marks of 50% and above.
Pass	A Pass in all courses with average marks of 40% and above.

Formula for Average mark calculation for semester wise and overall

$$Average\ mark\ (Semester) = \frac{\sum_{i=1}^{n} C_i P_i}{\sum_{i=1}^{n} C_i}$$

Where, C_i is the credits assigned to the course

P_i is the percentage of marks corresponding to the course

n is number of all courses successfully cleared during the particular semester

$$Average\ mark\ (Overall) = \frac{\sum_{i=1}^{n} C_i P_i}{\sum_{i=1}^{n} C_i}$$

Where, C_i is the credits assigned to the course

P_i is the percentage of marks corresponding to the course

n is number of all courses successfully cleared during the all previous semester

7.2. **Ranking**

At the end of VI Semester of the Diploma Examination, the First 10 candidates who have secured the highest marks among all IIHT's shall be placed in Rank List in the order of merit. Candidates who pass all the examinations in First attempt only shall be placed in the Rank List.

Candidates who had appeared in arrear (Back paper) Examination shall not be awarded Rank.

8. AWARD OF DIPLOMA:

Candidates shall be awarded Diploma in Handloom & Textile Technology or Post Diploma in Textile Processing on successful completion of the Program.

9. DATE OF AWARDING DIPLOMA:

The date of awarding Diploma shall be the date of declaration of result of the final semester of Diploma/Post Diploma Examinations.

10. ISSUE OF CERTIFICATES

Following certificates will be issued by IIHTs

a) Course Completion Certificate and Character Certificate shall be issued to the candidates by the respective Institutes after the completion of the period of regular Final Semester Examinations for the respective candidates.

b) Transfer Certificate shall be issued by the respective Institute to the candidate after passing the Diploma/Post Diploma program or after discontinuing the program.

c) Migration certificates will be issued to the needy students after receiving the request letter from them.

d) All the above Certificates shall be collected by each candidate in person from the institute, where he/she has studied.

e) If any candidate is unable to collect the certificate in person from the institute, he/she may send a signed request letter requesting to send by post. In this case, the candidate shall remit Rs 100/- online to the institute's bank account towards postal charges and submit the proof of payment along with the request letter. After receiving the request and postal charges, the certificates will be sent by post to the address of the candidate available in the office record.

f) Simple unsigned requests through email will not be entertained for issue of any of the above document/certificate

g) The students shall collect all their semester mark sheets (If they were not issued earlier) and course completion certificate before leaving the campus on completion of final semester without fail.

h) The consolidated Semester mark sheets of candidates who pass in the final semester examination, but do have arrears in the lower semester examinations, will be withheld till they clear all the arrears. Such with-held mark sheets will be revoked and issued to the candidates along with the Provisional/Diploma Certificates, when the candidates do pass their arrear papers

11. REVALUATION OF ANSWER BOOKS

a) After declaration of semester examination results, the students can apply for either photocopy of answer book or revaluation or both by making payment of prescribed fees in each case.

b) When a student apply for revaluation, he/she has to make payment of prescribed fees within the stipulated time. Revaluation request by the students after the stipulated time will not be entertained on what so ever reason.

12. ISSUE OF DUPLICATE DOCUMENTS OF MARKSHEET, DIPLOMA CERTIFICATE & TRANSFER CERTIFICATE

Duplicate copy of Semester Mark Sheet, Diploma Certificate and Transfer Certificate shall be issued only against proof of loss. Certificate of non-traceability from the Police authorities and an affidavit signed/ authenticated by a Notary public shall be submitted along-with application for issue of duplicate copy of the document. Prescribed fee shall be remitted by the candidate along with the application to the concerned Institute. The copy of document shall be issued and marked as "**DUPLICATE"** by the examination cell after due verification of records

13. CONDUCT OF STUDENTS IN THE EXAMINATION AND PENALITY FOR ACTS OF MISCONDUCT

13.1. **GUIDELINES TO CANDIDATES APPEARING FOR SEMESTER EXAMINATIONS**

a. Student must bring the Hall Tickets for both regular and arrear examinations without fail.

b. All candidates including external candidates shall bring their **valid Identity card** for every examination for verifying their identity in the examination hall. Candidates without ID card shall not be permitted to write the examination.

c. If the Identity card is lost, candidates shall approach the Chief Superintendent of examinations for obtaining Temporary Identification Certificate.

d. The candidates are advised to view their Hall and **seating arrangements** well in advance. Candidates are requested to note their **Hall, Row and Seat Number** for each examination, which will vary from day to day.

e. The candidates are not permitted to possess **Cell Phones / Programmable Calculators** inside the examination hall. It shall be kept outside the examination hall. Possession of Cell Phones inside the examination hall shall be treated as Malpractice.

f. The candidates **should not stand** near the examination halls during examination Sessions, so as to avoid disturbance to the candidates writing the examinations

g. The candidates are advised to enter the examination hall immediately on the ringing of first siren (15 minutes before the commencement of examination). The candidates should occupy their seats before the commencement of examinations. **They should not study or stand in the verandah near the examination halls during this time.**

h. The candidates shall bring their own data books/IS codes/Data sheets/Tables which are necessary for any particular examination. Students are required to check and ensure that the Data books/IS codes/Data Sheets/Tables brought by them do not contain any written material or additional sheets in them. If found, it shall be reported as Malpractice.

i. Before commencement of examination, candidates shall check their table drawers Calculator covers and Pouches, to ascertain that no incriminating materials are kept inside and any material found shall be given to Hall Superintendent immediately. If found later, they will be held responsible.

j. No candidate will not be permitted to enter the Examination Hall after 30 minutes from the time of commencement of exam whatsoever the reason be for late.

k. Strict silence shall be maintained inside the exam hall. They should not talk to other candidates inside the exam hall.

l. The candidates should write their **Register Number** in the Answer book at the place marked. They should also fill other details required on the first page of Answer book. Wrong entry of Register Number may result in cancellation of the exam in that course.

m. The candidates are advised to go through the instructions given in the Answer book.

n. On receiving question paper, the candidates shall require to verify the Course code, Course title, Number of pages and Number of questions in the question paper. If there is any discrepancy, the candidates are advised to bring it to the notice of the Hall Superintendent immediately.

o. **Malpractice** will be viewed very seriously. The **punishment** shall be awarded based on the nature and severity of the malpractice as mentioned in the annexure.1

p. **Time schedule to be adhered on examinations days:**

Activity	Forenoon	Afternoon
Entry into Examination Hall	9.45 AM	1.45 PM
Distribution of Question paper	9.55 AM	1.55 PM
Closing Time of Examination	1.00 PM	5.00 PM

q. After completing the examination, the candidates shall personally handover the answer books to the Hall Superintendent. Keeping the answer book on the table and leaving the examination hall is not allowed.

13.2. **Candidates Found Copying or Misbehaving During the Examination:**

During the examination, if a candidate is found copying or using or attempting to use unfair means would not be expelled from examination unless he/she has been ousted for gross misbehavior. The Hall superintendent shall provisionally permit such candidate to appear for the remaining / full examination at the Centre with the following conditions. The Candidate's answer book and copying material if any, shall be seized and his written undertaking shall be obtained by the Hall Superintendent. A fresh answer book shall then be issued for writing the rest of examination. The Hall superintendent shall report the matter to the chief Superintendent of the particular Exam Centre. Chief Superintendent should reach the incident site immediately and record the nature of incident. Chief Superintendent shall report the matter with full details to the Convenor, Board of Academic Affairs on the same day. The Convenor shall place the matter before the Chairman of Board of Academic Affairs for appropriate action. The concerned candidate shall be asked to appear before disciplinary committee constituted by the Chairman, Board of Academic Affairs. The Disciplinary committee shall consist of (1) Chairman, (2) Convenor, and (3) Head of the Institute where the candidate appeared in the examination (the prescribed formats for hall Superintendent's report and candidate's statement are annexed).

During the Disciplinary committee meeting, The Director / Principal / HoO shall produce necessary evidence against the students who indulged in malpractice. Hall superintendent should also been informed about the enquiry and to give necessary clarification to the committee during enquiry either over phone or video conference mode, if necessary. At the same time, the student should also be given fair chance to defend himself for the complaint made against him/her. If a student fails to attend the disciplinary committee meeting, the decision of the committee is final and further appeal by the student shall not be entrained.

14. CONDUCT OF EXAMINATION, SETTING OF QUESTION PAPERS & EVALUATION

a) The Hall Superintendent / Internal / External Examiners and other ancillary staff members required for conducting theory and practical examination in each centre shall be appointed by the Chief Superintendent of the Examination, who in general will be Head of Institute.

b) The Head of the Institute shall submit the list of candidates registered for appearing in the examination to the Convenor, Board of Academic Affairs at least 45 days prior to the date of commencement of examination.

c) No course teacher without prior permission from the Chief Superintendent of Examination shall be allowed in the Examination Hall.

d) Each Director/Principal/HoO shall submit the list of subject experts for setting up the question papers and evaluation of answer books to the Convenor, BOAA as and when request is made.

e) Usually, once in every 2 academic years Convenor, BOAA will update the list of subject experts submitted by all IIHTs and accordingly update the panel of examiners

f) The convenor in consultation with Chairman of Board of Academic Affairs shall appoint paper setters and examiners out of the panel of examiners.

g) In case of any exigency, the Examination cell shall set the question paper from the question bank available and arrange for evaluation as per the advice of Chairman / Convenor, BOAA.

The paper setters may be asked to prepare one or more sets of questions papers. One set will be chosen by the Board of Academic Affairs for that particular examination. The remaining set(s) will be kept as standby set may be used in emergent situations.

h) The Subcommittee-1 of BOAA shall arrange for the moderation of question papers.

i) For each course of Practical Examination, Internal and External Examiners would jointly examine each candidate or group of candidates.

The Chief Superintendent of Examination of each Institute shall prepare and finalize the schedule of practical examinations in consultation with the external examiners.

j) Examiners after evaluation of answer books shall submit the result of the examination of the respective course to the Convenor, Board of Examinations before the date fixed for this purpose.

k) The examiner's award of marks as shown in the award sheet/ statement of marks submitted by them shall be final.

l) The question papers for the examination shall reach the Superintendent of Examination at each centre at least one week before the date of examination and the same shall be kept in safe custody.

m) **All IIHTs under the state sector shall transfer the revaluation fees to IIHT Salem by NEFT and intimate the same to the Examination cell for taking further necessary action.**

n) Central sector IIHTs shall remit the revaluation fees to the Govt account and issue a certificate in this regard to the Examination cell functioning at IIHT Salem.

o) **A maximum of 10 marks deviation (Increase) after revaluation will be accepted and should be recorded in the result. If the deviation is more than 10 marks, it will be referred to the third examiner for revaluation and the marks closer to first evaluation will be taken in to the account. In case of decrease in marks after revaluation, marks of the first evaluation shall be taken as final.**

15. SCRUTINY AND TABULATION OF MARKS

Examiners evaluating the answer books shall enter the marks in the mark sheet in figure and words both. Marks recorded in the Mark List received from the examiners shall be entered as it is in the Examination Management System Software. Answer books received from the examiners shall be scrutinized by the ECC with the help of EC staffs before tabulation. Discrepancies in marks, if any shall be brought into the notice of the convenor for reconciliation /ratification. **Tabulation of marks will be done manually by using Examination Management Software and double check method.** The ECC is responsible for the timely receipt of answer

booklet, scrutiny and tabulation of mark in the web portal. Convenor shall monitor all these activities for timely progress of work. He along with the members of subcommittee-2 of BOAA need to check the correctness of work before declaration of results.

16. DECLARATION OF RESULT

The Sub Committee – II of Board of Academic Affairs shall declare the result during the meeting and report the matter to the Governing Body.

17. RETENTION PERIOD OF ANSWER BOOKS

Answer books of candidate shall be preserved for a period of **5 years** from the year of admission of the candidate and thereafter, those answer books will be destroyed.

18. GRIEVANCE REDRESSAL

There are provisions for grievance redressal at three levels: -

18.1. At the level of the course teacher concerned.

18.2. At the level of Director/Principal/Head of Office of respective IIHT

18.3. At the level of the all IIHTs, a committee constituted by the Convenor, BOAA in consultation with the Chairman, BOAA.

The grievances regarding assessment shall be filed within three working days of announcement of marks / results by the course teacher/Director and the decision shall be taken within the next five working days.

The grievances regarding semester examination shall be filed within four working days after the publication of result with the Convenor. The Convenor shall review the grievances and submit the same to the Chairman along with his recommendations.

If required, Convenor shall constitute a committee comprising Directors of 3 IIHTs. The Director of the institute in which the complainant studies will be the presenting officer. The report or observations of the committee shall be submitted to the convenor within five working days of the constitution of committee and the final decision shall be given to the concerned student after getting approval from the Chairman, BOAA.

19. CONSTITUTION OF COMMITTEES / PANEL FOR EXAMINATIONS

The following Committees / panels shall be constituted by the Convenor in consultations with the Chairman of BOAA to facilitate the smooth conduct of examinations.

a) Panel of Question Paper Setters
b) Panel of Examiners
c) Scrutiny committee

19.1. Panel of Question paper setters/Examiners:

Convenor shall constitute a panel of Question paper setters consisting of required number of question papers setters in consultation with BOAA Chairman for each semester.

The following guidelines shall be followed in the constitution of Board of question paper setters.

a) The panel prepared by the Convenor, BoAA shall be treated as highly confidential and shall not be included in the minutes of the meeting of the BoAA. He/she shall handover the panel to the ECC.
b) There shall be a minimum of 2 and maximum of 4 members in the panel of question setters for **each course** and the tenure of the panel shall be two years.
c) Every two years, the existing panel available with the Convenor shall be forwarded to the Chairman of the BOAA along with proposed panel with necessary changes for revision and approval.
d) For selecting new examiners, the first preference shall be given to those who have had three years or more of teaching experience and who have not been appointed so far.
e) ECC shall send the offer of appointment signed by the Convenor to the Question Paper Setters picked from the panel of examiners atleast **within 15 days** of the commencement of the concerned semester.

f) Copies of all communications from the ECC/Convenor, to the examiners in the conduct of examinations, shall be maintained in the office of the ECC.

g) In case, any examiner is found inefficient or indulging in misconduct, malpractice, negligence or disobedience, the ECC shall report the names of such persons to the Convenor BOAA and the Convenor who may disqualify such persons from being examiner/ paper setter in future. The action taken in this matter shall be reported to the Chairman BOAA.

19.1.1 Qualifications of Question Paper Setters/Examiners:

a) A teaching faculty member with not less than 3 years of experience in relevant course in any College, University or Research Institute shall be appointed to set the question papers.

b) Persons with five years of industrial experience in relevant areas could also be considered, to set question papers.

c) Convenor shall be competent to approve appointments as Question Paper Setters waiving the above requirements in exceptional cases and his/her action shall be reported to the Chairman. However, in ordinary case this should not be practiced.

19.1.2 Appointment of Question Paper Setters/Examiners and their Duties:

a) Appointment of Question Paper Setters is considered as the most important aspect of the examination system and its confidentiality is of paramount importance.

b) Convenor shall appoint question paper setters from the panel of question paper setters in consultation with BOAA Chairman.

c) The appointment of question paper setters/examiners for each semester shall be made and confirmed before 30 days of the commencement of the examination for theory courses.

d) No question paper setter shall ordinarily be assigned for more than two question papers at a time.

e) The question paper setters are required to set one or more number of papers for each course, one for use in the ensuing examination and another as reserve for additional exam if any conducted or for next semester as the case may be.
    i. The following materials are to be sent along with the request.
    ii. Copy of the guidelines for question paper setter's
    iii. Syllabus of the concerned course /courses
    iv. Bloom's Taxonomy
    v. Question paper Format
    vi. Claim forms for remuneration
    vii. Check List
    viii. Declaration / Certification
f) The Question paper setters shall submit / send the question papers to the ECC in protected format before the last date intimated.
g) The password for opening the protected format of question paper shall be sent to the Convenor.
h) Copies of the communications from the ECC office to question paper setters which are relevant in the conduct of examination, shall be maintained in the office of the ECC.

19.1.3 Instructions to Question Paper Setters/Examiners

Question Paper Setters should strictly comply with the following instructions:

a) All Question Paper Setters are required to keep their appointments strictly Confidential.
b) Any "special direction to candidates" and instructions regarding the answering of different sections in different answer books, if applicable, the number of questions to be answered or the choice amongst them shall be specific, precise and free from any ambiguity.

c) Questions must be set with relation to the prescribed course of study and the books recommended by the BOAA of the IIHT and must conform to the standard and syllabi.

d) All pages shall be numbered. While numbering the pages, the total number of pages shall also be indicated e.g.1/3, 2/3, 3/3 where 1, 2 etc. refers to the numbers of pages and 3 the total number of pages.

e) Every question shall be clear and definite in language as also in regard to the form and nature of the answers expected. The question shall not be vague or farfetched and shall be evenly distributed over the entire syllabus of the course.

f) The papers shall be such that a candidate of **decided ability** well prepared in the course can reasonably be expected to answer the paper completely within the allotted time.

g) Question Paper Setters shall maintain the secrecy very strictly with regard to copies of text books or notes or extracts used in setting question papers, and drafts or copies of question papers shall be kept in safe custody. These papers shall be destroyed as soon as the question papers are finally prepared and sent to the ECC. All the soft copies of the question papers shall be deleted from the computer after submitting the same to the ECC.

h) In writing questions, care shall be taken to see that words or phrases familiar to India, and technical terms and proper names are clearly written in Block letters to prevent the possibility of mistakes. Abbreviations of any kind shall be avoided unless they are essentially required. Special care must be taken in the delineation of mathematical signs and index figures.

i) Each question paper must contain the name of the examination, the name of the course, the total marks assigned, the duration of the paper and special directions, if any. In the case of question papers which are common to two or three examinations, mention shall be made of the fact in the heading itself. The marks assigned to each question shall be noted against the question concerned on the question paper. Marks for sub-divisions of

questions shall also be indicated. The maximum marks for the whole paper shall also be noted at the top of each question paper.

j) All the question papers shall be complete in respect of headings and directions to candidates, if any, and in form ready for printing.

k) Question papers can be sent to the ECC through password protected email or in compact disc.

l) The envelope for sending communications to the examiners shall be marked as ‘CONFIDENTIAL’.

m) The teaching faculty members of IIHTs who decline to serve as examiners shall be asked to furnish their explanation in writing for doing so and the matter may be reported to the competent authority for initiation of disciplinary action.

n) All routine correspondence relating to examinations shall be addressed to the ECC, IIHT, Salem by designation and not by name. In all correspondence, by letter or by e-mail, full details of the examiners shall be given below the examiner's name to enable easy identification of the examiner and also for prompt action to be taken. Urgent matters, if any, may be communicated over the mobile or telephone as given in the communication.

o) Examiners are appointed for valuing answer books and/or for conducting Viva-voce and/or practical examinations /or Invigilation at the Institutions held during any session. Examiners appointed for any session of examinations shall hold office for that particular session only.

p) Examiners who have accepted the appointment and declined the work later on without assigning acceptable reasons and thus cause inconvenience/ reschedule of examination, are liable to be removed from the panel for a period of three years.

q) The appointment of examiners is offered on the distinct understanding that such persons have not involved in private tuitions during the two years previous to their appointment and that they will not acquire any such connection or undertake any

private tutorial or coaching work during the period of their examinership.

r) In case any member of the examiner's family or any near relative is appearing for the examination for which he/she is an examiner, the fact shall be promptly reported to the ECC giving the name and register number of the candidate.

s) Every examiner engaged in the valuation of answer books shall furnish in the prescribed form given to him/her together with the answer books, the correct number of answer books received for valuation and return it to the ECC after all the answer books allotted to him for valuation have been received by the examiner.

t) All examiners in a course should do their best to secure uniformity of marking/grading. Answers to questions and subdivisions of questions should be marked against them and the marks/grades awarded to each question subdivision shall be entered on the cover page of the answer book also.

u) If the answer books have been revalued by the ECC, the revalued marks/grades whether there is any difference from the original marks or not shall be shown in green ink and be signed in full.

v) Answers must be checked a second time to verify that no answer to a question or a sub division has been left out in the evaluation.

w) If there are grave defects in the valuation, totalling of marks/grades or entering of the marks, or inefficiency in the discharge of duties entrusted to them, without prejudice to any other action that may have been taken against him/her, the examiners who default by entering wrong grades/marks, by giving wrong totals and by not valuing answers to questions shall be removed from the panel for a period to be decided by the Convenor BOAA / ECC.

x) Marks/grades should be carefully entered in the mark/grade books supplied by the ECC in the serial order of the register numbers of the candidates as given in the answer books. Fractions of marks in the total of each paper should be brought to

the next integer, which alone should be entered in the mark sheet. In no case, should a candidate be given more marks/grade than the maximum.

y) The answer books should be kept in the safe custody of the office of the ECC for a period of one year after the publication of the results.

z) The scheme of valuation along with answer key shall be provided by the Convenor BOAA for facilitating the evaluation process.

aa) Practical Examinations will be held at the Institution in the respective laboratories. The work at practical examinations will be prescribed by the Convenor BOAA / ECC.

bb) The answer books and also the mark sheets of the practical examinations shall be submitted to ECC immediately after each practical examination is over.

cc) Examiners should take special care to see that there is no erasure, correction or overwriting of marking in the mark sheets as far as possible. If correction becomes necessary, it must be attested with full signature.

dd) Marks should be written in words also. The word will be indicating individual digits.

ee) Every examiner should prepare the mark sheet and submit to the ECC.

ff) Examiners who have sufficient reason to suspect malpractice on the part of any candidate or candidates should forthwith make all possible preliminary investigation and communicate to the ECC immediately through the Convenor BOAA forwarding all material evidence available. The nature and possible punishments inflicted for will depend largely upon the evidences furnished.

gg) Attempts made by candidates or other interested persons to influence the examiners with regard to the valuation of any of the answer books shall forthwith be reported to the ECC for further action.

hh) The Convenor BOAA may award moderation of marks in consultation with question paper setter, ECC etc., only for the following reasons:

i. unusual difficulties in the question paper and/or

ii. Deviation of the question paper setter from the prescribed syllabus or standard.

ii) The arbitrary award of additional or grace marks/moderation is strictly forbidden.

19.2. **Scrutiny Board**

19.2.1 Members of scrutiny board / Moderators shall be as follows:

a) Convenor of BOAA

b) Director / Principal / Head of Office of all IIHTs

c) Exam Cell Co-ordinator

d) Subject Expert (s) on need basis with approval of Chairman, BOAA. If the chairman is not present in the meeting, Convenor may approve the subject expert(s) invited to the scrutiny board on behalf of the Chairman.

19.2.2 The objectives of the scrutiny shall be to ensure that the questions:

a) are in conformity with the prescribed syllabus and scheme of examinations

b) have the required standard

c) are free from typographical and grammatical errors

d) are such that the marks allotted are in accordance with the knowledge level expected-out of the question.

19.2.3 Scrutiny committee members shall make necessary modifications, if required, in the question papers to achieve the objectives mentioned above.

After scrutiny, the members of scrutiny committee shall hand over all the question papers personally to the ECC after affixing the signature in the scrutinized / moderated question papers

The details of the question papers received by the ECC shall be entered in a register and will be added to the Question Bank for printing.

19.3. **Instructions to Moderators**

a) Attend in time, to avoid delay in Question Paper distribution.

b) The objectives of Question Paper Moderation are to see that

i Question paper model is as per specified format.

ii All the questions are within the syllabus.

iii The data is sufficient for answering questions.

iv The figures are visible.

v The marks weightage distribution is as per blue print.

vi To find the requirement of data table / graph sheets etc.,

c) The out of syllabus questions shall be replaced by the questions that are within the scope of the syllabus. For any other clarifications, contact Convenor of BOAA/ECC.

d) Use of cell phones is prohibited during moderation time.

e) The abstract details of the moderation are to be entered into the datasheet available with ECC office.

f) Moderators have to keep in mind that without moderation, examination could not be conducted for that course. So, utmost priority is to be given for moderation work. Due to unavoidable circumstances, if you could not attend moderation, it should be immediately informed to Convenor, BOAA.

g) The moderators have to bring their own materials (Textbooks, Calculators etc.) that required for the moderation of question paper.

20. CONDUCT OF EXAMINATIONS

20.1. **Methods of Examination**

Unless otherwise provided for, Examinations shall be conducted by one or more of the following methods: -

a) Written

b) Practical
c) Computer assisted testing
d) Oral (Viva-voce)

20.2. **Schedule of Examination:**

The ECC shall prepare the examination calendar for every academic semester, well in advance, and shall publish the same in the Institution website. The information regarding the same shall be passed on to Director of all IIHT's. All examinations of the semester shall be conducted as per the examination calendar. The ECC shall issue the time table of various examinations in every semester, one month before the commencement of the Semester Examinations.

20.3. **Registration to the Examination:**

a) All students admitted in a programme (Diploma /Post Diploma) with remittance of prescribed fee are eligible for the forthcoming semester examinations, unless he/she is withhold for any disciplinary action or attendance shortage. The list of eligible students shall be submitted to the ECC's office by the Head of Office of concerned IIHT.
b) Online application for registration to the various Semester Examinations shall be forwarded to the ECC in the prescribed format.
c) The eligible candidates who secure the prescribed minimum attendance of the total duration of the course and possess other minimum qualification prescribed in the regulations for each course shall be issued the hall tickets.
d) The mode of fee remittance for the examination shall be through the concern IIHT Exam Co-ordinator.
e) The concern IIHT Exam Co-ordinator in turn remit the fees collected to ECC with details of students registered and number of courses each student appearing for the examination.

20.4. **Preparation of Nominal Roll**

A nominal roll showing the name of examination, month and year of examination, name and register number shall be prepared for each examination by the ECC. Details such as total number of candidates registered, number of regular students, number of arrear candidates may be given for each courses for easy reference.

20.5. **Preparation of Hall Tickets:**

The hall ticket of the eligible candidates shall be generated in the ECC's office with name, register number and recent photograph of the candidate. The hall ticket shall contain the details of the courses with codes and titles for the concerned semesters with date of the examination in chronological order. The register number shall be the number allotted to a candidate on his/her registration for the first semester examination. The hall ticket shall be issued to the students one week before the commencement of the examinations.

20.6. **Preparation of Answer Books:**

a) The main answer books to be supplied for the examination shall be prepared well in advance with specific format and different serial codes by the ECC.
b) Required number of blank answer books shall be handed over to the Chief Superintendent / Deputy Controller of Examination nominated for the purpose of the examinations.

20.7. **Question Paper Bundles:**

a) The required question papers shall be packed in sealed covers with details regarding the name of examination, the month and year of examination, name of the course, date and time of examination and number of copies of question papers enclosed. A question paper statement in prescribed format shall be prepared showing the details regarding the name of examination, the month and year of examination, subject /course code, number of question papers required and the number of question

paper packets prepared for each day. The statement and the entries on question paper covers shall be compared and ensured that entries are correct.

b) The parcels of question papers and the memorandum of the content of the sealed covers in the parcel shall be handed over to the Director, IIHT **10 days before the commencement of examination**.

c) Director, IIHT should verify that the seal and cover of the parcels are intact and descriptions on the cover of each sealed cover agree with those in the memorandum of content received.

d) Safe custody of the question paper packets and also the answer books supplied from the Director office for the concerned semester examination on each day will be the responsibility of the Director.

e) The Director opens the Question paper covers in the presence of exam co-ordinator and an invigilator 30 minutes before the commencement of exam. The number of question paper for each hall is counted and packed in a separate cover and distributed to the invigilators 10 minutes before the commencement of examination at their respective halls.

f) The invigilator shall distribute the question paper to the students after a bell indicating the commencement of the exam. The answer booklets are collected back after the bell indicating the end of the examination.

g) The unused answer booklets and question papers are collected from the hall after 45 minutes from the commencement of examination and kept under safe custody of the chief superintendent.

20.8. **Cancellation of Hall Tickets:**

The Director can cancel the hall ticket issued in the name of any candidate for misconduct or if it is found out that he/she is ineligible to take the examination, after allowing an opportunity to the candidate to present his/her case.

20.9. **Appointment of Exam Co-ordinates:**

Director shall be the Chief Superintendent of all examinations conducted in the Institution. However, Director can handover the charge to the senior most Faculty on special situations or in his absence. An additional exam coordinator and such other staff as required for the conduct of the examinations at the Institution shall be appointed by the Director.

21. Some important instructions

The ECC is responsible for communicating the necessary instructions to the various stakeholders of the examinations conduct.

21.1. **Instruction to Exam Coordinator of the Examination Venue:**

The Exam Coordinator is responsible for the efficient conduct of examinations at the venue. The chief Superintendent may appoint any one teaching faculty member as Exam Coordinator.

21.1.1 The following guidelines may be followed by the Exam Coordinator for the smooth conduct of the examinations.

a) Exam Coordinator shall ensure that
   - the list of candidates appearing for the examination
   - required number of answer books and
   - the stationery required for packing answer books are received at the venue 3 days prior to the commencement of examinations, and kept under safe custody.

b) He/ She should ensure that the question papers are received an hour before the commencement of examination for each session, from ECC.

c) Seating arrangement for the candidates (printed register number to be pasted on the desk at the right upper corner)

d) Examination room is clean, properly lighted and that no writing is there on the desks/walls or board.

e) Room/ hall wise seating plan for candidates are displayed at a prominent place. Selection of appropriate number of invigilators

from among the faculty members of the college, well in advance as per norms.

f) The minimum distance between the two candidate appearing for the same question paper should be 6 feet all around.

g) See that the examination hall is opened only 20 minutes before the commencement of the examination. The students are to be instructed to occupy their seats 10 minutes before the commencement of the examination.

h) See that arrangements are made for ringing the bell as detailed below. For a 3-hour examination starting at 10.00 a.m., the bell timings shall be as follows:

i) Similar timings shall be followed for examinations commencing at 2:00 p.m. The above schedule of timings shall be appropriately modified for examinations commencing at other timings.

j) In an unforeseen event of late commencement of examination, the time lost should be compensated. Any such instance should be immediately reported to the ECC telephonically. However, late commencement of examinations beyond 30 minutes is not permitted, under any circumstances.

k) Ensure that the invigilator for each room collects the answer books 15 minutes before the commencement of examination and that they proceed to the examination room.

l) Mobile phones, programmable calculators and other electronic gadgets should not be allowed into the examination room even if they are switched off. If any student brings in such materials to the examination hall, they have to be taken into custody by the invigilator and submitted to the Chief Superintendent at the earliest.

m) Keep utmost vigil throughout the examination process. The Director/Exam coordinator may frequently visit the examination hall and ascertain that the invigilators are doing their duties and are not engaged in conversation, standing on the veranda, reading or writing inside the examination hall.

n) **A candidate shall not be allowed to write the examinations, if he/ she do not have a valid hall-ticket. However, if a student reports that his/her hall-ticket is lost, or could not bring the Exam coordinator, after receiving a written request from him/her along with required fees, shall forward it to the Director through a messenger (not the candidate).**

o) All used answer books shall be packed within 30 minutes after the examination is over. The name of the course and roll numbers of candidates should be written on all packets using a sketch pen.

p) All packets should be sealed using cello tape.

q) Unused answer books shall be counted and kept in safe custody and a stock register should be kept for this purpose.

r) In case of using answer papers of different series; the Exam coordinator shall decide which series of answer books should be issued on a particular session/day. He/she should take this decision one hour prior to the commencement of the examination.

s) The Exam Coordinator is responsible for keeping proper accounts for the stock and use of the answer books.

t) Before opening the outer packets of the question papers, verify and assure that it is the right one for the day/session.

u) The question booklet cover shall be opened only 30 minutes before the commencement of the examination. This should be done in the presence of an invigilator, Exam Coordinator and Director. He/ She should ensure that the seal of the question paper cover is intact. They should sign in the space provided on the cover to ensure the same.

21.1.2 Bundling of Written Answer Books:

The Exam Coordinator shall make sure that the written answer papers are packed course wise properly in the answer book boxes / covers immediately after the examination. The bundles shall be sent to the ECC's office after all the examination over on

the particular semester. The bundles should have the following details: -

a) Serial number
b) Title of the paper /course
c) Date of examination
d) Number of candidates registered
e) Number of answer books in the bundle/Box/Cover
f) Initials of the Director / Exam Coordinator
g) The details of the bundles received in the ECC's office shall be noted in a register with the date.

21.1.3 Consolidated Absentees Statement**:**

The consolidated list of absence should be prepared and forwarded as per the direction contained in the printed instructions. They should be forwarded at the end of each session of the exam to the ECC.

21.2. **Instructions to the Hall Superintendent:**

Invigilation is one of the most important tasks required to be performed during the conduct of an examination. Impartial invigilation helps not only to check the use of unfair means but also to keep the morale of the candidates high. The Exam Coordinator shall go through the 'Instructions for the **hall Superintendent** and give necessary directions as and when required.

21.2.1 A set of guidelines for the invigilators are given below.

a) Report to the Exam Coordinator half an hour before the commencement of the examination.
b) Be present at the time of the opening of the question paper cover.
c) Collect correct number of answer books from the Exam Coordinator and proceed to the hall 15 minutes before commencement of the examination scheduled for that day/ Session.

d) Candidates need to be admitted only if they have valid hall ticket. If not, direct them to the Exam Coordinator for necessary guidelines.

e) Help the candidates to locate their seats. If any of the candidates is in possession of mobiles phones, calculators, or digital diary or any other electronic equipment instruct him/her to keep them outside the examination hall.

f) Distribute the answer book 5 minutes before the commencement of the examination (short bell) and direct them to fill in the register number and other entries in appropriate places.

g) Distribute the question paper at the strokes of the short bell and ask the candidates to start writing.

h) Verify the identity of the candidate through the photograph on the hall ticket and obtain the signature of the students present in the prescribed attendance sheet after verifying the register number in the hall ticket and that written on the answer book and other relevant entries made by the students.

i) The invigilator shall mark his/her signature on the answer book after verifying that the details filled in by the candidate are correct.

j) Invigilators shall sign on the back side of the hall ticket for having verified the hall ticket and details written on the cover page of the answer book.

k) The invigilator shall hand over the register number of absentees and the unused answer books and question papers to the messenger sent by Exam Coordinator, after the expire of 45 minutes from the commencement of examinations.

l) No candidates shall be allowed to leave the examination hall till the expiry of 45 minutes, from the commencement of examination and no candidate who leaves the room during the period allotted for the paper shall be allowed to return within that period.

m) Candidates who leave the examination hall more than half an hour earlier than the scheduled time for the close of the examination should surrender their question papers with their names and register numbers written on them to the invigilator and the candidate(s) may collect them back after the examination, if they so desire.

n) Candidates who leave the hall refusing to surrender the question papers, as stated above shall not be allowed to take the examination on subsequent days and the matter may be reported to the Principal/Controller of Examinations.

o) Ten minutes before the closing of examination, along with the warning bell (short bell), announce ‘last ten minutes’ and do not allow any candidate to leave the room. After the last bell (long bell) ask the candidates to stop writing and put their pens down.

p) Collect the answer books and arrange them in the order of register numbers and hand over the same with attendance list to the Exam Coordinator.

q) Candidates shall be permitted to leave the examination hall only after his/her answer book is taken charge of by the invigilator on duty in the hall.

r) Invigilators shall leave the examination premises after Exam Coordinator allows.

21.2.2 **Important Notes:**

a) No Candidates be admitted if they do not have valid hall tickets.

b) Candidates shall be admitted to the examination hall 15 minutes before the scheduled time.

c) No students shall be admitted to the examination hall 30 minutes after the commencement of the examination.

d) See that strict silence is maintained in the examination hall. Talking amongst candidates, borrowing of materials etc. should be strictly forbidden.

e) Do not give any clarifications to the students regarding mistakes in question paper, mode of answering etc.

f) Allow the use of logarithm tables, data books, calculators etc. only if the uses of these are permitted as per the instructions given in the question paper.

g) Do not allow mobile phones or any electronic equipment in the examination hall.

h) Keep alert, vigil and check the use of unfair means in the examination hall. In case of any unfair indulgence, immediately take custody of the incriminating materials and the hall ticket and make a report to the Chief Superintendent.

i) Do not allow any candidate to write on the question paper. Advise them to use the last page of the answer book for rough work.

j) Do not allow refreshments for the candidates in the examination hall.

k) Do not make any correction in the register number written by a candidate on his/her answer book. In any such cases ask him/her to correct it and then counter sign it.

l) Candidates should not be allowed to leave the hall before the expiry of 30 minutes from the commencement of the examination.

m) See that candidates who leave the examination hall more than half an hour earlier than the scheduled time for the close of the examination surrender their question papers with their name and register number written on them.

n) Permit the candidates to leave the examination hall only after handing over the answer book to the invigilator.

21.3. **Instructions to Candidates:**

Common instruction to the candidates are given in the section 13.1

21.3.1 **Exclusion of Candidates on Account of Disease:**

Any candidate shall be excluded by the Director/ Exam Coordinator from an examination, on being satisfied that he/she

is suffering from any infectious or contagious disease. As an exceptional case such a candidate shall be permitted to take the examination by giving a separate seat in the vicinity of Exam cell office. (Such cases shall immediately be reported to the ECC office)

21.3.2 **Exclusion of Candidates for Misbehaviour:**

Candidates taking an examination shall be under the disciplinary control of the Chief Superintendent, and shall obey his/her instructions. In the event of a candidate disobeying instructions of the Chief Superintendent / Invigilator or behaving insolently towards the Chief Superintendent / Hall Superintendent, without prejudice to any other action that may be taken against him/her, the candidate may be excluded from the day's examination and if he/she persists in his/her misbehaviour he/she may be excluded from the rest of the examinations by the Chief Superintendent. The Principal, after giving an opportunity to present his/her case may according to the gravity of the offence further punish the candidate by cancelling the examination taken by him either in whole or in part or debarring him/her from appearing for any examination for a specified period or permanently. The matter may be intimated to the Convenor for further action.

21.3.3 **Debarring Candidates and Quashing Results:**

If at any time after the publication of results, it is found that a candidate was not eligible for taking the examination, as per the rules and regulation / norms / orders issued by the Institution relating to the course concerned or that he/she has secured admission to the course or the examination, on production of false information in the application form or that he/she has used unfair means at an examination, the Director / HoO / Principal shall have power to quash the results of the examination, taken by the candidate, and cancel the registration and / or debar him / her from appearing for any examination of the Institution

permanently or for a specified period considering the gravity of the offence committed by the candidate, pending an enquiry into the same. In all such cases, before taking final decision by the Director the candidate shall be given an opportunity to present his/her case.

21.4. **Instructions for Squad Members**

a) Once entered into examination hall, thoroughly check the student, to find out any material that is useful for malpractice (some guidelines are given below). If found, use the report available with invigilator to register malpractice.
b) Complete the squad report (enclosed) and handed over the report to Convenor, immediately after the inspection.
c) You are also authorized to inspect any other parameter related to examination halls, invigilation and incorporate the comments in your report.
d) Checklist to act as guidelines (report of special invigilator) is enclosed for your reference.

21.5. **Guidelines for frisking the student:**

a) Ask the student to stand and come out of his / her place.
b) Verify :
    a) Pockets.
    b) Answer sheet, question paper, hall ticket.
    c) Table, rack, chair, chair handle.
    d) Hand kerchiff, purse, duppatta.
    e) Pants, sleeves, forearms (ask the student to move sleeves up) legs below knees (ask the student to move pants up) waist (by touch), and collar (by touch).
    f) Ask him to remove his shoes (slips may be inside the shoes).
c) Only female faculty members are allowed for frisking of girl students ‘by touch’.

d) **Any kind of perpetration by the squad towards girl student in the name of frisking shall be deserved for police complaint and further disciplinary action**.

21.6. **Important Announcements**

21.6.1 **During the commencement of examination, before the distribution of question paper**

a) Students are advised to fill all the details on title page of main answer book.

b) Students are advised to remove any written or printed material on their person, whether pertaining to the course or not.

c) Erase any material written on your body. Detection of any material during examination will be treated as malpractice.

d) Writing of hall-ticket numbers on the additional answer sheets is strictly forbidden and will lead to cancellation of the performance.

e) Writing any kind of messages or symbols not related to the examination on the answer sheets shall automatically leads to cancellation of examination(s).

21.6.2 **Announcements - immediately after distributing the question papers**

a) Check whether you have received the correct question paper or not.

b) Put your registered number on question paper.

21.6.3 **Other announcements**

a) Fifteen minutes before the end of an examination, Hall superintendent should warn candidates that **fifteen minutes of the examination period remain** and that candidates must remain in their places until the examination is over.

b) No additional booklets will be given.

c) Hall superintendent must also warn candidates when only **five minutes remain**.

d) Ask the students at the end of examinations, to remain sit in their seats until you collect all the answer scripts.

e) Tally the answer scripts, with the number of candidates assigned to you and after tallying, and if found in order, allow the student to leave the examination hall.

21.7. **Handling Malpractice case :**

a) When found a malpractice ask the student to stop writing the examination, complete the malpractice report (available with examination pad) and hand over all the material along with the report to the Chief superintendent at the end of the examination. A fresh answer book shall then be issued for writing the rest of examination.

b) Don't take decision like striking off the answer sheet and writing comments on the answer sheet. etc.

22. VALUATION OF ANSWER SCRIPTS

22.1. **Valuation of Answer Scripts:**

a) The ECC in consultation with Convenor / Director shall appoint valuation examiner(s) for each course.

b) The valuations must be based on the scheme of the course concerned.

c) The ECC shall arrange to affix dummy numbers on the answer books of each course, shuffle them and make a bundle of 25 and a part thereof.

22.2. **TABULATION AND PUBLICATION OF RESULTS**

22.2.1 **Tabulation Register:**

The Whole process of calculating the final marks shall be automated using computer programme. The ECC shall check all entries, grace marks if any awarded.

22.2.2 **BOAA- Sub Committee II**

The ECC shall prepare a statistics of the result with details listed below and present before the result passing board:-

a) Name of examination with month and year.
b) Number of candidates registered for the examination.
c) Number of candidates appeared for the examination.
d) Minutes of previous **Sub Committee II**
e) Course wise Internal & External mark comparison.
f) Results of readmitted candidates.
g) Overall result comparison programme wise.
h) Results of arrear courses (Passed out)
i) Proposal on moderation.
j) Revaluation, Results & Ratification.
k) Details of question paper collected, reviewed & used.
l) Details of attendance shortages, break of study & withdrawal

The minutes of the Sub Committee II shall be finalized immediately after the meeting and signature of all members shall be obtained.

22.3. **Publication of Results:**

The final approved result of the concerned semester examination shall be published by the ECC. The results approved by the BOAA sub - committee II-shall be posted in the website. The students can download the semester score sheet from the website.

22.4. **Mark Sheets:**

Computerized mark sheet shall be prepared semester wise after publication of results and Revaluation Process and issued to students by examination cell through institute director.

22.5. **Issue of Consolidated Statement of Marks:**

All candidates who have appeared for an examination conducted by the Institution shall be issued a computerized consolidated statement of mark sheet on successful completions of all courses prescribed for the award of Diploma.

22.6. **Transcripts:**

Transcripts shall be issued to successful candidates on request and on payment of the prescribed fees.

23. MISCELLANEOUS

23.1. **Shortage of Attendance:**

Candidate cannot seek Condonation for shortage of attendance on any ground. Every candidate is to secure minimum 75 % attendance of the total duration of the semester. If the candidate fails to secure 75 % attendance overall in the semester, he/she shall not be allowed to write any examination of that particular semester and he/she has to repeat semester again along with next batch of students. However, a candidate shall be allowed to write arrear examination if any in the previous semester.

23.2. **Important Registers to be maintained in the EC Office:**

- Inward registers
- Dispatch registers
- All Registers related to the planning, question paper setting and conduct of examinations.
- Registers relating to valuation of answer scripts
- IIHT wise results.
- Semester mark sheets
- Other registers specifically directed to be maintained in ECC's office and any other registers deemed necessary for easy reference.

Annexure – I

Different Types of **Malpractices** and the **Punishments** for them are given below

S.No.	Nature of Malpractice	Punishment
1	Appeal by the candidate in the answer script to show mercy by way of awarding more than deserving marks.	Cancellation of performance in concern course or all courses (based on severity)
2	The candidate writing his/her name in the answer script	Cancellation of performance in concern course or all courses (based on severity)
3	The candidate writing his/her registration number in places other than specified in the answer script.	Cancellation of performance in concern course or all courses (based on severity)
4	Any special marking in the answer script by the candidate which is deteriorating the integrity of any person / institution, caste or religion or sovereignty of the country etc.,	Cancellation of performance in concern course or all courses (based on severity)
5	The candidate communicating with neighbouring candidate orally or nonverbally; the candidate causing suspicious movement of his/her body.	Cancellation of performance in concern course or all courses (based on severity)
6	Irrelevant writing by the candidate in the answer script.	Do
7	The candidate either possessing the question paper of another candidate or passing his question paper to another candidate with the question paper containing additional writing on it.	Do
8	The candidate facilitating the other Candidate to copy from his/her answer script.	Invalidating the examination of the particular course written by the candidate.
9	The candidate possessing of any Incriminating material(s) (Whether used or not). For example: - Written or printed materials, bits of papers containing writing information, writings on scale,	Invalidating the examinations of the course concerned and all the theory and the practical courses of the current semester registered by the candidate.

	calculator, handkerchief, dress, part of the body, Hall Ticket, and on mobile phone, etc., Hiding the evidence like throwing out the bits of the papers and any other material(s) (or) destroying the evidence by swallowing the bits of papers.	
10	If the candidate comes in a drunken condition to the examination hall	Invalidating the examinations of all the theory and practical courses of the semester and all the arrear-courses registered by the candidate.
11	Abetting of malpractice	Any instances of abetting such practices at any stage or of CONDONATION of the malpractice by any faculty member/ non- teaching staff will be recommended to the DC(H) for disciplinary proceedings under the service rules.
12	Cases of impersonation	1. Handing over the impersonator to the police with a complaint to take appropriate action against the person involved in the impersonation by the Chief Superintendent. 2. If a student of this college is found to impersonate a “bonafide student”, the impersonating student is debarred from continuing his/her studies and writing the examinations **permanently.** 3. He/She is not eligible for any further admissions to any programme of the college. 4. Debarring the “Bonafide Student” for whom the impersonation was done from continuing his/her studies and

		writing the examinations **permanently.** He / She is not eligible for any further admission to any programme of the College. Further the candidate is not considered for revaluation of answer scripts of the arrear courses
13	The candidate possessing mobile phone(s) / Programmable Calculator(s) / any other electronic storage device(s) (Whether used or not). The candidate possessing the question paper of another candidate with additional writing on it. The candidate passing his/her question paper to another candidate with additional writing on it. The candidate passing discriminate materials brought in to the examination hall in any medium (hard/soft) to other candidate(s). The candidate copying from neighboring candidate. Vulgar/ Offensive writings by the candidate in the answer script. The candidate possessing the answer script of another candidate. The candidate passing his/her answer script to another candidate Appeal by the candidate in the answer script coupled with a promise of any form of consideration. The candidate misbehaving in the examination hall.	If the candidate has registered for arrear courses only, invalidating the examinations of all the arrear courses registered by the candidate. Invalidating the examinations of all the theory and practical courses of the current semester and all the arrear-courses registered by the candidate.

Additional Punishment:

1. If the candidate has not completed the Programme, he/she is debarred from continuing his/her studies for one year. i.e., for two subsequent semesters. However, the student is permitted to appear for the examination in all the arrear courses up to the last semester during the debarring period.

2. If the candidate has completed the Programme, he/she is prevented from writing the examinations of the arrear courses for two subsequent semesters.

Note:

Any matter, other than mentioned in the above examination Rules and regulation shall be the rights and discretion of the BoAA.

INDIAN INSTITUTES OF HANDLOOM TECHNOLOGY (IIHTs)
ACROSS INDIA

Central Government IIHTs

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