

S.Y.B.TEXT. (TPE) SEMESTER-I

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
3.1	TT/MMTT/TPE/TC	TEXTILE ELECTRONICS -I	3	---	---	2	100	25	---	50	175
3.2	TT/MMTT/TPE/TC	TEXTILE MATHEMATICS-III	3	---	---	---	100	---	---	---	100
3.3	TPE	MATERIAL ENGINEERING	3	---	---	---	100	---	---	---	100
3.4	TPE	MANUFACTURING PROCESSES	4	---	---	3	100	25	---	50	175
3.5	TPE	YARN MANUFACTURING MACHINERY-I	4	---	---	2	100	25	---	---	125
3.6	TPE	FABRIC MANUFACTURING MACHINERY-I	4	---	---	2	100	25	---	---	125
			21	---	---	9	600	100	---	100	800
L =LECTURES T =TUTORIALS DR=DRAWING PR=PRACTICALS			TP=THEORY PAPER TW=TERM WORK OE=ORAL EXAMINATION PE=PRACTICAL XAMINATION								

SECOND YEAR B.TEXT. – SEMESTER - I

3.1 TEXTILE ELECTRONICS – I (TT/MMTT/TPE/TC)

Lecturers	:	3 hrs/week
Practical	:	2 hrs/week
Theory paper	:	100 marks
Term work	:	25 marks
Practical Exam.	:	50 marks
Subject Total	:	175 marks.

- 1) **Electronics Components** :- Introduction to Electronics, applications of electronics, electronics components, passive components, resistors, colour coding of resistors, variable resistors, capacitors, colour code used for capacitors, variable capacitors, inductors, active components.
- 2) **Semiconductors** :- Semiconductor materials, metals, insulators, semiconductors, intrinsic semiconductor, extrinsic semiconductors, p-n junction diode, junction theory, VI characteristics of p-n junction diode, use of diode in rectifiers, half wave rectifier, full wave rectifiers, performance of rectifiers, filters-shunt capacitor filter, series inductor filter, Π filter, LC filter, zener diode, zener regulator, diode specification.
- 3) **Transistor** :- Junction transistor structure, working of transistor, relation between different currents in a transistor, transistor amplifying action, transistor configurations, transistor characteristics (More emphasis CE configuration). Basic CE amplifier transistor data sheet, transistor testing.
- 4) **Feedback in Amplifier & Op-Amp.** :- Concept of feedback in amplifier, Types of feedback, voltage gain of a feedback amplifier advantages of negative feedback. Amplifier circuit with negative feedback.
Op-Amp :- Introduction, block diagram, symbol, ideal op-amp, open loop, op-amp configuration, op-amp with negative feedback, IC741-pinout & specifications. Applications.

5) **Power Semiconductor Devices and Applications :-** SCR construction, Principle of operation, two transistor analogy, turning ON & OFF of SCR, SCR characteristics.

Triac.-Construction, working & characteristics. Diac- construction, working & characteristics.

UJT - Construction, working & characteristics. UJT as Relaxation Oscillator. Application of SCR – SCR Converter, SCR in DC Motor speed control. Triac in AC power control.

6) **Optoelectronic Devices :-** Classification of optoelectronic devices, emitters, sensors, optocouplers, LED, photodiode, phototransistor, LDR, photo voltaic cell, application of optoelectronic devices in textile.

7) **Transducers :-** Transducer classification – Primary transducers, secondary transducers, electrical transducers active & passive transducers, analog & digital transducers, advantages of electrical transducer, Basic Requirements of a transducer.

Primary Transducers for pressure measurement – Diaphragm bourdon tube, Bellows.

Temperature Transducers – Resistance temperature Detector (RTD), Thermocouple thermistors.

Strain Measurement – Introduction, factor affecting strain measurement, types of strain gauge. Theory of operation of resistance strain gauge, types of electrical strain gauge, properties of strain gauge, materials for strain gauges, gauging techniques, applications. Variable inductance type transducers, linear variable differential transformers (LVDT), capacitive transducers, Piezo electric transducers.

Note :- Emphasis should be given on applications of above transducers in textile industry.

8. **Electromechanical Devices:-** Electromagnetic relay, Reed relay, Solenoid valve, Limit switches, Electromagnetic clutches.

LIST OF EXPERIMENTS :-

- 1) Forward & reverse bias characteristics of diode.
- 2) Full wave rectifier (with & without filter).
- 3) I/O characteristics of transistor in CE configuration.
- 4) Op-amp inverting & non-inverting amplifier.
- 5) UJT characteristics.
- 6) Study of AC power control using triac.
- 7) LDR characteristics.
- 8) Speed measurement using optical & magnetic pickups.
- 9) Study of RTD and thermister characteristics.
- 10) Study of strain gauge characteristics.
- 11) Study of LVDT characteristics.
- 12) Study of inductive & capacitive pickup.
- 13) Study of SCR characteristics.

REFERENCE BOOKS :-

1. Basic Electronics & Linear Circuits by N.N. Bhargava, D.C. Kulshreshtha TMH Pub.
2. Electronic Devices and Circuits by Allen Mottersshade, PHI Pub.
3. Modern Industrial Electronics by T.J. Maloney. Fourth Edition, Prentice Hall Pub.
4. Electrical & Electronics Measurements & Instrumentation by A.K. Sawhey, Dhanpat Ria & Sons Pub.
5. Instrumentation Devices & Systems by C.S. Rangan, G.R. Sharma, TMH Pub.
6. Electronics Components & Materials by Madhuri Joshi
7. Op-amp & Linear Integrated Circuits by Ramakant Gaykwad.
8. Thyristor & their Applications by Ramamurthi.

SECOND YEAR B.TEXT. – SEMESTER - I

3.2 TEXTILE MATHEMATICS-III (TT/MMTT/TPE/TC)

Lectures	:	3 hrs/week
Theory Paper	:	100 marks.
Subject Total	:	100 marks.

1) Differential equations of first order & first degree :

Method of Solution :-

Variable, separable, homogeneous, non homogeneous, exact, non exact, linear and non linear differential equations.

2) Linear differential equations of n^{th} order with constant coefficients :-

Solution $y = C.F. + P.I$

Methods to find C.F. and P.I.

Homogeneous linear differential equations with constant coefficients.

3) Analytical solid geometry :-

Introduction to three dimensional co-ordinate system & sphere.

4) Surfaces & Curves in the Space :-

Tangent plane, Normal line to the surfaces in the space, Normal plane, Osculating plane, Principal normal & binormal.

5) Testing of hypothesis :-

Introduction, Hypothesis, Statistic, Critical Region, Errors in testing, Level of Significance.

6) Large sample tests :-

Test for population mean, equality of population means population proportion & equality of population proportions.

7) Small sample tests :-

Test for population mean, equality of population means, population variance, equality of population variance. Test for goodness of fit and independence of attributes. Test for significance of population correlation co-efficient.

8) Estimation :-

Point Estimation, types, unbiased estimators of population mean and variance.
Interval Estimation, Confidence Interval for population mean based on normal and 't' and χ^2 distributions,

9) Statistical quality Control :-

Process Control : Control charts, X-chart, R-chart, C-chart, np-chart, P-chart.

Lot Control : AQL, LTPD, AOQ, AOQL, O.C. Curve, Single and Double sampling plans.

REFERENCE BOOKS :-

1. A Text Book of Applied Mathematics : by J.N. & P.N. Watarikar.
2. Higher Engineering Mathematics by B.S. Grewal.
3. A Text Book on Engineering Mathematics by Bali, Saxena & Iyengar.
4. Mathematical Statistics by J.Fruend.
5. Applied Statistics & Probability of Engineers by Montgomeri & Runger
6. Probability & Statistics for Engineers by Johnson.

SECOND YEAR B.TEXT. – SEMESTER - I

3.3 MATERIAL ENGINEERING (TPE)

Lectures	:	3 hrs/week.
Theory Paper	:	100 marks.
Subject Total	:	100 marks.

1) Introduction to Material Engineering :-

Definition of engineering materials, classification scope of the subject, structural studies of materials – Types of bonds, atomic and ionic radius, interatomic distances, vander waals forces. Crystal structures, molecular structures, amorphous phases.

2) Properties of Engineering Materials :-

Mechanical – hardness, strength, compression, fatigue and creep.

Thermal – specific heat, thermal conductivity, thermal expansion and thermoelectric effect.

Chemical – ionization and electrolysis.

3) Metallic Materials -

Cast iron, Wrought iron and steel, effect of addition of elements such as Si, C,P, Mn, N to Iron. Elastic and plastic deformation, heat treatments alloys such as stainless steel, brass, bronze, duralumin, alnic Nichrome, solder material.

4) Ceramic Materials :-

Introduction, types, polymorphism, deformation and fracture in glass. Properties of refractory material, refractories such as a) Chromates b) Zircon c) High alumina refractories d) Porcelain.

Cement, types manufacturing process, setting & hardening, uses.

5) Organic Materials :-

Polymers , Polymerisation, types, mechanisms, plastics, types, properties and applications, properties and applications of bakelite, Nylon 66, rubber –

classification vulcanisation, protective coatings such as paints, polishes and varnishes.

6) Electrical and Magnetic Materials :-

Factors affecting the resistivity of conductors, properties of materials such as Ag, Cu, Al, Nichrome and Ca as dielectric characteristics, insulating materials such as mineral oil, PVC, Mica fibres, glass and asbestos, Magnetisation, soft and hard magnetic materials such as a silicon iron, Alnico types alloys and ferrites.

7) Corrosion :-

Definition, types, mechanism, factors affecting rate of corrosion. Presentation of corrosion – proper selection of material and proper designing, alloying, metallic coatings – hot dip process, spraying, electroplating, cementation, cladding.

8) I) Various textile materials, their properties and applications. Glass wool, Polyester film, insulation flets, filters etc.

ii) Materials used for textiles – bobbins, picker, leather, wood for shuttles, ring travellers etc.

9) Composite Materials -

Introduction, constituents of composites, types of composites, processing of fibre reinforced composites, failure of fibre reinforced composites.

REFERENCE BOOKS :-

1. Material science by R.B. Gupta.
2. A text book of material science by V.K. Manchanda.
3. Material science and engineering by V. Raghavan.

SECOND YEAR B.TEXT. – SEMESTER - I

3.4 MANUFACTURING PROCESSES (TPE)

Lectures	:	4 hrs/week
Practical	:	3 hrs/week
Theory Paper	:	100 marks
Term Work	:	25 marks.
Practical Exam.	:	50 marks.
Subject Total	:	175 marks

1) Traditional Metal Cutting Processes :-

Principles of Traditional Metal Cutting Processes like Turning, milling, drilling, Reming, Boring. Concept of general purpose machine & special purpose machine.

2) Advancement in Machines :-

Requirement of advancement in machinery, Introduction to NC machine, CNC machine, DNC machine.

Classification of CNC machine – According to number of axis, according to CNC control system. ATC & Tool magazine.

3) Non-Traditional Machining Methods (NTMM) :-

Introduction, classification, Information about the processes EDM, ECM, AJM, LBM, Plasma are cutting.

4) Protection of Machined Surfaces :-

Requirement of protection & information about Electroplating, Galvanizing, Metal Spraying, Tinning, Painting,

5) Mechanical Working of Metals :-

Hot working of metals, Cold working of metals & concept about the processes like Rolling, Extrusion, Drawing, Metal Spinning.

6) Forging :-

Introduction, various tools used, Basic forging operations, Hand forging, machine forging, open-die forging, close-die forging, forging defects & causes.

7) Press Work :-

Press machine and its parts, various press working operations like various cutting operations & forming operations.

8) Special Casting Processes :-

Die casting – Hot chamber, cold chamber, centrifugal casting, semi-centrifugal casting, centrifuging, Investment casting, chilled casting.

Practicals (Mechanical Workshop)

1. Fitting Job : Male Female Fitting - 1 Jobs
1. Turning Job : Assembly job containing following operations –
Facing, Step turning, Taper turning, Knurling, Threading, etc. -1 Job
3. Identification of manufacturing processes of textile machine components .

Practical Examination :

2 Jobs from Fitting & Turning (one each) – Time duration 4 hrs. each

Total - 2 Jobs, 8 hrs.

SECOND YEAR B.TEXT. – SEMESTER - I

3.5 YARN MANUFACTURING MACHINERY-I (TPE)

Lectures	:	4 hrs/week
Practical	:	2 hrs/week
Theory Paper	:	100 marks
Term Work	:	25 marks.
Subject Total	:	125 marks

1. BLOW ROOM :

- a. Engg study of Automatic Bale Openers – Concept of automatic bale opening – Principals of operation – advantages limitations and prerequisites – Developments in automatic bale openers. Detailed study of automatic bale openers used in the industry (LMW, Trumac, Rieter, Marzoli and others). General construction, driving arrangements, dimensions and specifications, types of bale lay down, settings and timings, power requirements, stop motions, safety arrangements, productions.
- b. Engg. Study of Mild Openers – Concept and importance of mild opening – General design aspects of a mild opener – History and developments - Detailed Study of present day mild openers from various manufactures (LMW, TRUMAC, RIETER, MARZOLI & Others) – General construction, driving arrangement, dimensions and specifications, setting and timings, power requirements, stop motions, safety arrangements, production, online monitoring.
- c. Mechanics of Blenders – Importance of blending – Methods used for Blending of cotton in Blow room – History and Development of Mechanical Blenders – Detailed Study of present day blenders used in the industry - General construction, driving arrangement, dimensions and specifications, setting and timings, power requirements, stop motions, safety arrangements, production, online monitoring.
- d. Engg. Study of Fine Openers – Concept and principle of operation, design features – History and Developments – Detailed Study of present day fine openers used in the industry (LMW, TRUMAC, RIETER, MARZOLI & Others) - General construction, driving arrangement, dimensions and specifications, setting

- and timings, power requirements, stop motions, safety arrangements, production, online monitoring.
- e. Material Transportation – Concept and Principle – Detailed Study of material transportation equipments used in Blow room. Pneumatic aspects of material transportation.
 - f. Safety control used in Blow room – Metal detectors – Heavy parts separator, smoke detectors.
 - g. Study of Auxiliary equipments in Blow room – dedusters, contamination removers.
 - h. Study of on line monitoring and controlling system used in blow room.
 - i. Assessment of Performance of a Blow room – Intensity of opening, openness value, cleaning efficiency. Influence of action of blow room machine on cotton fibre quality – Factors affecting opening and cleaning at Blow room.

2. CARDING :

- a. Feed to Card – Principle and concept of chute feed to card. Advantages and limitations. Study of design details of different types of chute feeding systems available in the market. Mechanical details of feed to card.
- b. Engg. Study of Revolving Flat Card – Detailed study of mechanical design in Take in zone, Cylinder Flat Carding Zone – Doffer Zone – Sliver formation – Study of cards used in the industry – General construction – Driving arrangement, production calculations, draft calculations, stop motions – on line monitoring – Tandem Cards.
- d. Mechanism of Carding – Opening of fibre mass – Carding actions – Web formation and fibre configuration – Blending – Levelling action – Fibre breakage.
- f. Transfer efficiency of card – importance, concept. Factors related to transfer efficiency of card.
- g. Autolevellers at Card – Basic principles and concept – Types of autolevellers – Principle of working of autolevellers at Card – Setting of autolevellers, type of sensors.

- h. Engg. Study of Card Clothing – History and Development – Metallic wire – Tooth geometry – Maintenance of Card Clothing – Card wire mounting. Details of wirepoints on licker-in cylinder, doffer.
- i. Assessment of performance of card – Cleaning efficiency, Nep removal efficiency, fibre breakage.

3. Centralised Waste collection System :

Design features, operating principles.

LIST OF EXPERIMENTS :-

1. Study of Bale Opening machine - Dimensions, Driving arrangement, calculations.
2. Study of Coarse cleaning machines. Dimension, Driving arrangement, calculations.
3. Study of Mixing machine. Dimension, Driving arrangement, calculations.
4. Study of Fine cleaning machine – Dimension, Driving arrangement , calculations.
5. Study of De-dusting machines – Dimension, Driving arrangement, calculations.
6. Study of chute feed system.
7. Study of constructional details of a card.
8. Driving arrangement and calculations of carding machine.
9. Settings of various parts of feed zone of carding.
10. Settings of various parts of carding zone in carding.
11. Study of flat grinding & card grinding m/c.
12. Study of change places on card.
13. Processing of Material on card and evaluating card performance.

REFERENCE BOOKS :-

1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series
 - Vol I-The Technology of short staple spinning by W.Klein
 - Vol II-A Practical Guide to opening and Carding by W.Klein.

2. The characteristics of Raw Cotton by P.Lord.The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part-I.
3. Opening and cleaning by Shirley. The Textile Institute Publication, Manual of Cotton Spinning Vol II, Part II.
4. Cotton Ginning, Textile Progress, The Textile Institute publication.
5. Opening cleaning and picking by Dr.Zoltan, S.Szaloki, Institute of Textile Technology, Verginia.
6. Cotton opening and picking by G.R.Merril.
7. Fundamentals of Spun Yarn Technology, By Carl Lawrence.
1. Cotton Growing and marketing, J.S.Parmar, Tecoya Trend Publication.
2. Blow room and carding –Training program conducted by NCUTE, IIT Delhi.
3. Carding by F.Charanlay .The Textile Institute publication, Manual of cotton spinning series Vol-III.
4. Essential calculations of practical cotton spinning by T.K.Pattabhiraman.
5. Blow room, Carding, Draw frame-by Prof.A.R.Khare
6. Technology of cotton spinning by J.Janakiram.

SECOND YEAR B.TEXT. – SEMESTER - I

3.6 FABRIC MANUFACTURING MACHINERY-I (TPE)

Lectures	:	4 hrs/week
Practical	:	2 hrs/week
Theory Paper	:	100 marks
Term Work	:	25 marks.
Subject Total	:	125 marks

1) AUTOMATIC WEAVING :-

- a) Limitations of ordinary looms :- Production, efficiency, quality & allocation, objectives for developing automatic looms, scope for automation.
- b) Design features of automatic looms :- Drives, loom motions, accessories & other critical features of automatic looms.
- c) Weft feelers :- Construction working of side sweep (Cimmco & Ruti-B Type), electrical (Ruti-C Type) & electronic weft feelers, their merits, demerits & applications.
- d) Transfer mechanism :- Cimmco & Ruti-C transfer motion's working & construction, shuttle protector, temple & shuttle eye cutter. Requirement for successful transfer of pirn, reasons of stripping, bottoms & remedies. Shuttle changing mechanism & safety motion, its applications.
- e) Automatic let-off motion :- Principles and requirements of automatic let-off mechanism, types, construction & working of Cimmco, Ruti-B, Ruti-C type let-off motions.
- f) Warp stop motion :- Types, Construction and working of mechanical and electrical warp stop motion, Types of drop pins, specifications & applications.
- g) Centre weft fork :- Construction & working of Ruti-C type center weft fork motion & its advantages.
- h) Operator assisting motions :- Pick finding, heald leveling, light indicators, pick counters need, functions & use.
- i) Auto loom fabric defects, causes and remedies

2) **FABRIC STRUCTURE :-**

Study of presentation of following weaves on graph (Design, draft & peg plan) & study of weave characteristics & weaving requirements.

- i) Stripe & check weave combination – selection of weaves, joining of weaves, firmness, classification & construction of designs.
- ii) Colour & weave effect.
- iii) Simple spot designs.
- iv) Backed fabrics – Warp, weft and wadding, backed fabrics.
- v) Bed ford words – Plain, twill, wadded crepon cords,
- vi) Weft & Pique :- Plain, wadded & wadded pique.
- vii) Figuring with extra threads :- Principles, extra warp, extra weft figuring, combination, limitation, extra thread effect.
- viii) Gauze & Leno :- Principles, basic sheds, Leno with flat steel doupes & slotted doupes, point draft or counter leno, simultaneous top & bottom douping, application of slotted doupes & double slotted doupes, easing & shaker motion concept, working & construction.
- ix) Double cloth :- Object, classification, self stitched doubled cloth, center stitched double cloths, interchanging double cloth, multiplayer fabrics.
Selection of face & back weaves, type of stitching points & their selection, wadded double cloth.

3) **AUTOMATIC WINDING :-**

- a) Classification of automatic winding machine P & Q winding, their application.
- b) Construction of automatic winding machines
 - i) Design features, i.e. yarn path (Creel, link presenter, booster, unwinding accelerator, pre cleaner, tensioners, waxing cradle etc.)
 - ii) Drive to drums, scroll details, super drums, braking etc.(Autoconer – 238,338,338 D, Savio Espero & Orion, Murata – 11C, 7-V.)
 - iii) Special features of all models, blowers, air consumption & power etc.
- c) Yarn Clearing :-
 - i) Technical back ground

- ii) Optimum clearing.
- iii) Uster classimat as a aid for yarn clearing.
- d) Electronic yarn clearers
 - i) Optical & capacitance, Lofe, TK 930F, TK 950H, Quantum-II etc.
 - ii) The capabilities of different yarn clearers.
 - iii) Detailed method of setting of optical & capacitance type clearer (for carded & combed yarns)w.r.t. N,DS, DL,LL,-D,-L,C, Cluster setting, splicer setting, extended splicer setting for various yarn counts and materials.
 - iv) Siro cuts.
 - v) Knot factor & clearing efficiency & its use as an aid to assess the performance of winding machines.
- e) Splicing :-
 - i) Types – mechanical & pneumatic, details of construction, parameters, their applications .
 - ii) Electronic checking of spliced joint.
 - iii) Splice quality assessment (strength, appearance, hairness)
 - iv) Maintenance of splicers.
- f) Study of various & delivery packages.
- g) Package Quality :-
 - i) Details of package faults observed on automatic winding machines causes & remedies.
 - ii) Mechanism for anti patterning, maximum diameter of package, auto doffing & restarting.
- h) Technical requirements of winding process :-
 - i) Yarn unwinding
 - ii) Yarn take up
 - iii) Yarn tensioning
 - iv) Wound package requirements for warping, knitting & weaving.
- i) Calculations :- Efficiency, production & allocation.

4) MODERN WARPING :-

- a) Constructional details & features of modern warping machines. Such as Benninger, West Point, Sucker-Mullar, Tsdakoma & Karl with reference to design of creel, pre-tensioners, automatic adjustment of central control of tensioners.
- b) Types of re creeling – magazine , truck , chain creels , semi – auto & auto creels, creel – master, auto plan for colour patterns.
- c) Head Stock -
 - i) Beam warping – Auto leasing, drive, brakes and automation doffing & donning.
 - ii) Sectional warping – Auto leasing drum traverse & cone angle adjustment, beam traverse & its adjustment.
 - iii) MIS systems & its use.

LIST OF EXPERIMENTS :-

1. Dismantling and resetting of under pick motion.
2. Dismantling and resetting of Cimmco & Ruti-C weft feeler motion.
14. Dismantling and resetting of Cimmco auto let-off motion.
15. Dismantling and resetting of pirn change motion.
16. Dismantling and resetting of clutch motion.
17. Study of Ruti-C loom –drive, centre weft fork, pick finding, take-up drive, back rest, multi pawl drive, shuttle construction, picking, loose reed etc.
18. Study of sectional warping drive – warping speed, beaming speed, reed & beam traverse speed, production and efficiency.
19. Study of Laxmi and Senmet pirn winding machine. – spindle speed, traverse speed, coils per double traverse, diameter control, production and efficiency.
20. Visit to Auto loom unit.
21. Fabric analysis – Extra warp, weft, Bedford cord, pique, leno, double cloth, pile fabric.
22. Fabric analysis – Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.
23. Fabric analysis – Extra warp, weft, Bedford, cord, pique, leno, double cloth, pile fabric.

24. Visit to Autoconer unit.
25. Visit to Autoloom unit.

REFERENCE BOOKS :-

- 1) Principles of Weaving by Marks A.T.C. & Robinson.
- 2) Textile Colour & Design by Watson.
- 3) Weaving Machines, Materials & Methods by Prof. M.K. Talukdar, Prof.D.B. Ajgaonkar etc.
- 4) Textile Mathematics – Vol.-I & II by J.E. Booth.
- 5) Advanced Textile Design by Watson
- 6) Modern Preparation & Weaving Machines by A. Ormerod.

S.Y.B.TEXT. (TPE) SEMESTER-II

SR. NO.	COMMITTON TO COURSES	SUBJECTS	TEACHING SCHEME				EXAMINATION SCHEME				
			L	T	DR	PR	TP	TW	OE	PE	SUB. TOTAL
4.1	TT/MMTT/TPE/TC	THERMAL AND AIR ENGINEERING	3	---	---	---	100	---	---	---	100
4.2	TT/MMTT/TPE/TC	TEXTILE MATHEMATICS-IV	3	---	---	---	100	---	---	---	100
4.3	TPE	ELECTRICAL TECHNOLOGY	3	---	---	2	100	25	---	50	175
4.4	TPE	ANALYSIS OF MECHANICAL ELEMENTS	3	---	---	2	100	25	---	---	125
4.5	TPE	YARN MANUFACTURING MACHINERY-II	4	---	---	2	100	25	---	50	175
4.6	TPE	FABRIC MANUFACTURING MACHINERY-II	4	---	---	2	100	25	---	50	175
4.7	TPE	TEXTILE MACHINE DRAWING	---	---	2	---	---	50	---	---	50
			20	---	2	8	600	150	---	150	900

L =LECTURES
T =TUTORIALS
DR=DRAWING
PR=PRACTICALS

TP=THEORY PAPER
TW=TERM WORK
OE=ORAL EXAMINATION
PE=PRACTICAL XAMINATION

SECOND YEAR B.TEXT. – SEMESTER - II

4.1 THERMAL & AIR ENGINEERING (TT/MMTT/TPE/TC)

Lectures	:	3 hrs/week
Theory Paper	:	100 marks
Subject Total	:	100 marks

1. Introduction – Laws of Thermodynamics – Zeroth Law, First Law, Second law of Thermodynamics. Thermodynamic Process – constant volume, constant pressure, constant temperature, adiabatic, polytropic & throttling process with P-V & T- ϕ diagrams and numericals..

2. Air Standard Cycle – Introduction, Assumptions in thermodynamic cycles, Important terms used in thermodynamic cycles, efficiency of a cycle, Carnot cycle, Otto cycle, Diesel cycle, Dual combustion cycle on P-V and T- ϕ diagram and numericals.

3. Properties of Steam – Formation of steam at constant pressure – Enthalpy, Enthalpy of water, Enthalpy of evaporation, Enthalpy of dry saturated steam, Wet steam, Superheated steam, Specific volume of steam, Steam table, External work done during evaporation, Internal energy of steam, difference between Gas & Vapour. Measurement of dryness fraction – Throttling calorimeter, separating calorimeter, combined separating & throttling calorimeter, Use of steam in textiles – Sizing, Wet processing and numericals based on properties of steam & calorimeters.

4. Steam Boilers – Introduction, Classification of boilers, Study & construction of fire tube boilers such as Cochran boiler, Study & construction of water tube boiler such as Babcock & Wilcox boiler, equivalent evaporation, efficiency of boiler & numericals.

5. Study of boiler mountings & accessories – Safety valve – Dead weight safety valve, Lever safety valve, Spring loaded safety valve, Combined high pressure steam & low water safety valves, Water level indicator, Fusible plug, Steam pressure gauge, Feed check valve, Stop valve, Blow off cock, Accessories – Feed water pump, Injector, Economizer, Superheater.

6. Thermic Fluid Heating System – Introduction, Thermic heating system, Expansion & Deviation, Selection of Tanks, Requirements of Fluids, Deterioration of fluid, Consequences, Cleaning of the system.

7. Refrigeration – Units of refrigeration, C.O.P., Difference between heat engine, Refrigerator, heat pump. Air refrigerator working on reversed Carnot cycle on P-V & T- ϕ diagram, expression for C.O.P.

8. Air Conditioning – Introduction to air conditioning, psychrometric terms, Dalton's law of partial pressure, Psychrometric relations, Enthalpy of moist air, Thermodynamic wet bulb temperature, Psychrometric chart, Psychrometric processes, - Sensible heating & cooling, bypass factor of heating & cooling coil, Humidification & dehumidification, methods of humidification in textile industry, methods of dehumidification, sensible heat factor, cooling & dehumidification, cooling with adiabatic humidification by steam injection, Adiabatic chemical dehumidification, Adiabatic mixing of two air streams, Object of a/c & proper humidification in textile mills, Effect of moisture on textile fibres, Sling psychrometer, Humidistat.

9. Compressor – Classification, Reciprocating, Rotary vane compressor, Liquid ring compressor, Twin lobe compressor, Screw compressor, Centrifugal compressor, Axial flow compressor. Pumps – Reciprocating, Centrifugal & Radial (working and principle only).

10. Pneumatics –

(a) Pneumatic Circuits – Symbols of cylinder, control valves, check valves.

(b) Air treatment – Air filter and its symbol, Refrigerated dryer, Lubricators.

(c) Control valves – Poppet valve, Pilot operated check valve and spool valve. Symbol of every valve,

(d) Loop system in piping lay out, Pressure drop in pneumatic line.

(e) Examples of pneumatic circuits.

REFERENCE BOOKS :-

1. Elements of Heat Engines (Vol. I & II) by Patel, Karamchandani.
2. Refrigeration & Air conditioning by Arora & Domkundwar
3. Pneumatic Systems by Majumdar
4. Hydraulics & Pneumatics by Andrew & Parr
5. Hydraulic machines by Banga, Sharma.
6. Heat Transfer by S.P. Sukhatame.

SECOND YEAR B.TEXT. – SEMESTER - II

4.2 TEXTILE MATHEMATICS-IV (TT/MMTT/TPE/TC)

Lectures	:	3 hrs/week
Theory Paper	:	100 marks.
Subject Total	:	100 marks.

1. Laplace Transforms :-

Definition, transforms of standard functions, transforms of derivatives, integrals and periodic functions. Inverse Laplace transforms by partial fraction and convolution method.

2. Vector differentiation :-

Differentiation of vector valued function of scalar 't', gradient, divergence, curl, directional derivative. Solenoidal and irrotational vector fields.

3. Vector Integration :

Line, surface & volume integrals, Stoke's and Green's and Guass divergence theorem (without proof) and examples.

4. Projectiles :-

Motion of a body thrown horizontally in the air. Motion of a projectile, equation of path of projectile, Time of flight of a projectile on a horizontal plane, Horizontal range of a projectile velocity and direction of motion of projectile, Time of flight of a projectile on a inclined plane.

5. Analysis of Multivariate Data :-

Multiple and Partial correlation coefficients. Plane of regressions.

6. Analysis of Variances :-

Introduction, One-way Classification, Two-way Classification with and without repetition.

7. Design of Experiments :-

Introduction, Basic principles, Basic Designs (CRD, RBD & LSD).

8. Factorial Experiments :-

Introduction & types, 2^n factorial experiments, 2^2 & 2^3 factorial experiments.

REFERENCE BOOKS :-

1. A Text Book of Applied Mathematics : by J.N. & P.N. Wattikar.
2. Higher Engineering Mathematics : by B.S. Grewal.
3. A Text Book on Engineering Mathematics :by Bali, Saxena & Iyengar.
4. Mathematical Statistics : by J.Fruend.
5. Applied Statistics & Probability of Engineers : by Montgomeri & Runger
6. Probability & Statistics for Engineers : by Johnson.
7. Design and Analysis of Experiments : by Montgomeri.
8. A Text Book of Engineering Mechanics : by R.S. Kurmi.

SECOND YEAR B.TEXT. – SEMESTER - II

4.3 ELECTRICAL TECHNOLOGY (TPE)

Lectures	:	3 hrs/week.
Practicals	:	2 hrs/week.
Theory Paper	:	100 marks
Term Work	:	25 marks
Practical Exam.	:	50 marks
Subject Total	:	175 marks

1. D.C. MOTORS:

Principle, working, types, performance, characteristics and applications, speed control. Modern methods of speed control using thyristor, [Torque calculation and simple Numerical based on speed control.]

2. A.C MOTORS:

3 Phase induction motors, principle, working , types, performance, characteristics, efficiency, modern methods of speed control using Electronics devices like thyristor invertors. Modern methods of starting A.C. motors.

3. SERVO MOTORS:

Construction, principle, working, types, applications of A.C. /D.C. servo motors, stepper motors, Introduction of 3 phase A.C. servo motors.

Selection & study of motors for various textile machineries like let off motor, take off motor, accumulator motor, main motor. Motors in humidification plant. Energy efficient motors (EEM) and ISI standards for motors used in Textile industries, possible faults in Textile motors and remedies.

4. POWER FACTOR IMPROVEMENT:

Concept of power triangle active power, apparent and reactive power, various modern methods of improving power factor and its importance in industries, APFC panel (mathematical treatment is necessary for power factor improvement), disadvantages of low P.F.

5. TARIFF:

Different types of tariffs, load Management, concept of energy Auditing, Measurement of active and reactive power using single watt meter and two wattmeter method. simple Numericals based on two wattmeter method, calculation of electricity bill of different textile mills and industries. [Simple problems on two-part tariff.]

6. SWITCH GEAR AND PROTECTION:

Fuses, Relays, Circuit breakers, characteristics and ratings, substation and types. [Different components of sub station] General rules regarding selection of fuses, relays, contactors, drives & cables. Selection of capacity of stabilizers.

7. ILLUMINATION:

Definition of all terms of illumination, discharge lamps, Fluorescent lamp, Metal halid lamps, CFL, different illumination schemes adopted in Textile mills. [Simple numerical problems]

Energy Efficient lighting systems.

List of Experiments:

1. Study of starter for three phase and single-phase induction motors.
2. Reversal of three phase A.C. and D.C. motors
3. Speed control of three phase of induction motors.
4. Measurement of three phase power by single watt meter method
5. Measurement of three-phase power by two-watt meter method.
6. Load test on three phase induction motors
7. No load and blocked rotor test on three phase induction motors
8. Load characteristics of stepper motors.
9. Load characteristics of universal motor.
10. Study of Electrical braking
11. Efficiency of Electric oven.

References:

1. Electrical Technology- by Prof. B.L. Theraja.
2. Electrical Technology- by Prof.H. Cotton
3. A.C Machines – by Prof. M.G. Say
4. Electrical Measurement and Instrumentation by Prof. A.K, Sawhny
5. Electrical Power Systems by Prof. S.L Uppal.
6. Switch Gear and Protection by Prof. S.Rao.
7. Modern Electric Traction System by Prof. H. Pratap.
8. A first course in Electrical drive –by- Prof.F.K.Pillai
9. Modern Industrial Electronics by Prof T.J. Maloney
- 10 Utility Engineering in Textile -(UET)Research Paper
- 11 Electrical Technology by Prof,U.A Bakshi.---- Text Book

SECOND YEAR B.TEXT. – SEMESTER - II

4.4 ANALYSIS OF MECHANICAL ELEMENTS (TPE)

Lectures	:	3 hrs/week
Practical	:	2 hrs/week.
Theory paper	:	100 marks.
Term Work	:	25 marks.
Subject Total	:	125 marks.

1. Strength and elasticity of material, simple stresses, strains, behaviour of brittle and ductile material under tension.
Relation between elastic constant, Poisson's ratio, Volumetric strain, principle of complementary shear stress.
2. Bending stress – Symmetric bending of beams, standard beam sections, built up sections, design problems. Study of bending in drafting roller.
3. Direct and bending stresses – Uniaxial bending, concept of biaxial bending, kern of section, chimneys subjected to wind pressure.
4. Distribution of shears stresses in beams of standard sections.
5. Strain energy and impact loading, concept of strain energy, strain energy in bending, stresses due to impact.
6. Torsion – Torsion of circular shafts, transmission of power through shafts. Power transmitted by shaft. Study of torsion in Textile m/c. shaft.
7. Riveted and welded connections : Analysis and design for direct loads.
8. Shear force and bending moment : Shear force and bending moment for simply supported beams, overhanging beams, cantilevers with point loads and uniformly distributed loads. SFD and BMD.
9. Slope and deflection of beams : Calculation of slope and deflection for simple beams with point loads and udl, Macaulay's method.
10. Testings of materials : Material properties, tension, compression, shear, hardness, fatigue, endurance limit, Testing procedure.

REFERENCE BOOKS :-

1. Strength of Materials : Ramamrutham.
2. Elements of Strength of Materials : S.P.Timoshenko & D.H. Young
3. Mechanics of Structures : S.B. Junnarkar
4. Strength of Materials : Vazirani and Ratwani

Term Work

Term work shall consist of experiments based on following tests :-

1. Tensile test on ductile material
2. Compression test on ductile material
3. Shear test
4. Izod impact test
5. Charpy impact test
6. Rockwell hardness test
7. Brinell hardness test.
8. Testing of Composite materials – hardness.

SECOND YEAR B.TEXT. – SEMESTER - II

4.5 YARN MANUFACTURING MACHINERY – II (TPE)

Lectures	:	4 hrs/week
Practical	:	2 hrs/week
Theory Paper	:	100 marks
Term Work	:	25 marks
Practical	:	50 marks
Subject Total	:	175 marks

1. DRAW FRAME :

- a) Functions of draw-frame. Principles of drafting and doubling. Study of constructional details & mechanical design of a drawframe. Calculations relating to speeds, drafts production etc.
- b) Principles of Roller drafting, mechanical design details of drafting system, design details of drafting system. Evolution of drafting systems at draw frame, (shirley 4/4 draftings, platts presser bar, whitin accu draft, Rieter polar drafting systems etc.) Developments in draw frame drafting.
- c) Suction at draw frame. Automatic can handling. Autolevelling at draw frame. On-line quality monitoring and control.
- d) Study of draw frames available in the market. Blending draw frames.
- e) Study of Maintenance aspects & design developments at draw frame, such as Rollers, Roller weightings, drafting systems, etc.
- f) Assessment of performance of drawframe. Defective production at draw frame, causes and remedies for the same. Norms for production, sliver quality, waste etc.

2. COMBER :-

COMBER PREPARATORY :

- A. Requirements of good lap – importance of number of passages, importance of good lap, linear density of lap, etc.
- B. Methods of comber lap preparation – Different sequences of comber lap preparation, Engg. study of sliver lap machine, ribbon lap machine, unilap machine. Developments in combing preparatory machines.
- C. Maintenance & Assessment of combing preparatory machines.

3. COMBING :

- A. Objects of combing process. Study of combing cycle.
- B. Mechanical design details of Comber- feeding, nipper assembly, cylinder and detaching rollers, cylinder needles, web and sliver transport, drafting and coiling at comber.
- C. Semi combing, normal combing, super combing and double combing. Forward and backward combing.
- D. Maintenance of comber. Index Cycle, Comber Settings.
- E. Assessment of performance of comber – Norms for production, speed. Combing efficiency, Fractionating efficiency of comber. Influence of combing operation on quality.
- F. Automatic and centralized noil extraction. Automatic materials handling. Stop motions in comber.
- G. Technical specifications of modern combers available in the world market.

4. SPEEDFRAME :-

- A. Objects of speed frame. Concept of drafting, twisting and winding process.
- B. Mechanical design aspects of Speedframe – Creel, Top arm apron drafting system, Spindle & Flyer assembly, Bobbin building at speed frame, stop motions.
- C. Study of mechanical details of – differential motion, swing motion, building mechanism, semi-automatic and automatic doffing, etc.
- D. Assessment of performance of Speedframe - Productivity and Quality norms of speed frame, Zero break concept, block creeling.
- E. Materials handling. Transport of bobbins to ring spinning machines.
- F. Maintenance of speed frame.
- G. Features of modern speed-frame machines available in the market.

LIST OF EXPERIMENTS :-

- 1) Driving arrangement and calculations of draw frame.
- 2) Study of roller settings on draw frame.
- 3) Driving arrangement & calculations of Sliver lap machine. Roller settings in Sliver lap machine.

- 4) Driving arrangement & calculations of Ribbon lap machine. Roller settings in Ribbon lap machine.
- 5) Study of constructional aspects, combing cycle & index chart of modern comber.
- 6) Driving arrangement & calculations in modern comber.
- 7) Comber setting.
- 8) Driving arrangement & calculations related to production, constants, draft twist etc. of modern speed frame.
- 9) Study of coils per inch of speed frame & differential gearing.
- 10) Study of building mechanism of speed frame.
- 11) Driving arrangement & calculations related to production, constants, draft twist etc. of modern ringframe.
- 12) Mill visit to study modern Drawframe, Comber, Speedframe, Ringframe.
- 13) Study of cots mounting and cots grinding machine.

REFERENCE BOOKS

1. The Textile Institute Publication –Manual of Textile Technology-Short Staple Spinning Series - Vol I-The Technology of short staple spinning by W.Klein
Vol III-A Practical training guide to Combing & Drawing by W.Klein
1. Practical guide to combing by W.Klein, Textile Institute publication Vol.3
2. Fundamentals of Spun Yarn Technology, By Carl Lawrence.
3. Essential calculations of practical cotton spinning by T.K.Pattabhiraman
4. Technology of cotton spinning by J.Janakiram.
5. Drawing, Combing and roving and speed frame by Zoltan, S.Szaloky, The Institute of Textile Technology, Verginia
6. Draw frame, combing and speed frame by J.H.Black; The Textile Institute publication, Manual of cotton spinning Vol-Iv part II.
7. Combing by Moor.
8. Spun Yarn Technology by Eric Oxtoby.
9. Elements of combing by A.R.Khare.
10. Cotton Drawing and Roving by G.R.Merril.
11. Manual of cotton spinning series, vol3, part 2 by J.Black et al Textile Institute Publication.

SECOND YEAR B.TEXT. – SEMESTER - II

4.6 FABRIC MANUFACTURING MACHINERY – II (TPE)

Lectures	:	4 hours/week
Practical	:	2 hours/week
Theory Paper	:	100 marks
Practical Exam	:	50 marks
Term Work	:	25 marks
Subject Total	:	175 marks

1) **SIZING :-**

Study of modern sizing machine element.

- 1) Creel – construction, braking arrangement & positive drive.
- 2) Size Box – various size boxes, 1 nip 1 dip, 2 nip 2 dip, dressing rollers, Zell, Sucker, West point, Benninger, Tsudakoma size box constructions various roller constructional details.
- 3) Drying Cylinders – Heating arrangement, coating, temperature & its control, pressure of steam, thermal performance of drying cylinders, steam traps & its types & importance.
- 4) Head Stock – Dry splitting, measuring motion ,drag roller, comb & drive to weavers beam, pressuring device.
- 5) Control Systems- Importance, consequences of moisture, temperature, size level, on line size percentage, Stretch control systems.
- 6) Factors affecting size pick up & size add-on, migration.
- 7) Assessment of sizing performance – laboratory & practical methods.
- 8) Concept of single end sizing & various methods.
- 9) Concept of dyeing cum sizing.
- 10) Automation and MIS on modern machines.
- 11) Concept of recycling of sizes.
- 12) Calculations – Related to size concentration, size pick up, stretch, drying, count of warp production etc.

2) FABRIC STRUCTURE :-

a) Study of presentation & cross section of following weave on graph paper & weave characteristics & weaving requirements.

- 1) Warp pile – wire method, face to face weaving & terry pile.
- 2) Introduction to tufted carpets.
- 3) Weft pile – velveteens & velours

b) Fabric Engineering :-

- 1) Peirce's yarn diameter formula & its limitations.
- 1) Fabric cover & crimp factors.
- 2) Cloth geometric of plain, twill weaver.
- 3) Practical application of cloth geometry & cover factor.

c) Construction & Development of Jacquard Designs :-

- 1) Elements of Jacquards shedding – Double lift, Jacquard with single & double cylinder working, Jacquard sizes, Harness tie, Harness drawing – in, card cutting & card lacking.
- 2) Harness & design calculation – Setting of harness, number of harness cords to each hook, casting out, size of repeat, count of design paper.
- 3) Development of Jacquard Designs – Construction of squared paper designs, Process of drafting a sketch design, drafting designs from woven fabrics.
- 4) Development of figures – Prevention of long floats, Bold & flat development, Development of large figures, use of warp & weft float, figure shading.
- 5) Insertion of ground weavers.
- 6) Factors influence woven designs.

3) SHUTTLELESS WEAVING :-

a) Limitations of shuttle loom with respect to weaving process, engineering aspects & environmental aspects.

b) Classification of shuttleless weaving machines.

c) Projectile weaving machine – History of shuttleless weaving machine ; Projectile machine models TWII To P7300 ; Machine drive, various motions timing, shedding Cam motion, Beat-up motion, limitations of shuttle loom picking motion; Projectile picking concept, picking motion, picking phases, Projectile

acceleration & retardation, torsion rod details, Projectile preparation for picking, selvedge motion, Receiving unit, Selvedge weaves, Let-off motion (Mechanical & power), Take-up motion, their advantages in relation to shuttle loom motions, specifications of projectiles & grippers for various applications, Machine speed, timings power specifications for various widths, all auxiliary motions such as brake, clutch, oiling cleaning MIS, General electronic circuit, pick finding, Multi colour weft insertion, weft stop, warp stop, whip roller, weft brake etc. Fabric defects & remedies.

d) Rapier Weaving Machine -

Various rapier weaving machines such as Picanol, Smit, Somet, Vamatex, Dornier, Sulzer, Panther etc. Various machine models available of above make & their brief history.

Study of weft velocity curves for looms with different methods of weft insertion. Concept of Dewas & Gabler rapier systems, their comparison with other weft insertion systems from weft acceleration & retardation point. Study of effect of reed width on loom speed.

Principles of different single & double rapier weft insertion systems (Drive), their comparison. Study of rapier heads.

Smit rapier machine models, machine drive, Timings of various motions, cam shedding & beat up motion, Rapier motion drive details, Details of rapier tape, head, sely construction, guiding elements, Gripper openers, cutters, stroke adjustment. Selvedge forming elements & adjustments.

Let-off & take up motion (Mechanical & power), their adjustments for various pick density range, specifications of rapier & head for various applications. Specifications speed, power & machine timing for various widths.

All auxiliary motions such as brake, clutch oiling, cleaning, MIS, General electronic circuit, pick finding, multi colour weft insertion, weft-stop, warp stop, whip roller, weft brake etc.

Fabric defects & remedies, weft waste during selvedge formation.

Detailed study of Dornier rapier weaving machine on above line.

4) HIGH SPEED SHEDDING MECHANISMS :-

- 1) Limitations of Tappet shedding motion, positive cam shedding concept & need, Positive cam shedding motions, constructional & working details (Ruti-C, Projectile, Rapier & Airjet), Adjustments essential during weave change and timing. Mounting possibilities, pitch of heald fineness.
- 2) Limitation of lever & cam negative dobbie, positive lever dobbie, positive rotary cam concept, Rotary mechanical & electronic control dobbie, mounting possibilities, pitch of heald frames, capacity, data transfer, adjustments during weave change, various models available in the markets.
- 3) Limitation of mechanical Jacquard, concept of electronic Jacquard, constructional & working details of electronic Jacquard, comparison between various Jacquard (Bonas, Staubli, Grosse) working principles, adjustment for various weaves, Jacquard capacity, mounting, suitability for various end uses, data transfer & management, Networking with looms.

LIST OF EXPERIMENTS :-

- 1) Dismantling and resetting of warp stop motion.
- 2) Study of shuttle change motion and silk loom features.
- 3) Loom operating – starting, stopping, knotting, & drawing –in & study of fabric defects.
- 4) General study of projectile machine and drive arrangements for various motions.
- 5) General study of flexible Rapier machine & drive arrangements for various motions.
- 6) General study of rigid Rapier machine & drive arrangements for various motions.
- 7) Study of positive cam motions of Sulzer & Ruti-C machine.
- 8) Study of Rotary mechanical & electronic dobby.
- 9) Study of electronic jacquard motion.
- 10) Fabric analysis of advanced structures.
- 11) Fabric analysis of advanced structures.
- 12) Fabric analysis of advanced structures.
- 13) Visit to Jacquard unit.

REFERENCE BOOKS :-

- 1) The Technology of Warp Sizing by J.B. Smith.
- 2) Modern Preparation & Weaving by A. Ormerod.
- 3) Textile Maths Vol.III by J.E. Booth
- 4) Principles of weaving by Marks & Robbinson.
- 5) Weaving machines & methods by Dr. Talukdar, Prof. D.B. Ajgaonkar.
- 6) Sizing by Sydel.
- 7) Shuttleless weaving by Svaty.
- 8) Modern Methods of Weaving by Duxburng.
- 9) Hand Book of Weaving – Sulzer Publication.

SECOND YEAR B.TEXT. - SEMESTER - II

4.7 TEXTILE MACHINE DRAWING (TPE)

Draw. Practical	–	2 hrs/week
Term Work	–	50 marks.
Subject Total	–	50 marks.

- 1) Study of IS conventions for drawing IS 696, IS 969 (Dimensioning with tolerance limits fits).
- 2) Drawing sketches of machine components such as Coupling Cotter joints, Knuckle joint, Bearings – types, Springs, Pipe joints, Belt drives, Pulleys, Gears and gear drives.
- 3) Free hand sketches of
 - a) Primary motions of loom.
 - b) Gearing plan of machines in spinning.
 - c) Differential gearing.
 - d) Comber index chart.
 - e) Detaching roller mechanism.
 - f) Coiler drive.
- 4) Detail drawing of various mechanisms / assemblies consisting of 6-8 components.
- 5) Assembly drawings of various mechanisms / assemblies from above consisting of 6-8 components.

- NOTE** : 1) One assembly and details consisting 6-8 components and required hardware their of with following information of component drawing.
- 2) In a semester 6 or 7 sheets containing min. three assy. & details are to be completed.

TERM WORK

- 1) One sheet on IS conversions for drawing IS 696 and 969.
- 2) One sheet on free hand sketches of m/c components and various m/c components assemblies.
- 3) Assembly & details drawing of flanged coupling or joints, assemblies, consisting of 6-8 components.
- 4) Assembly and details drawing of following mechanisms.
 - a) Take up motion – 7 wheel or 5 wheel.
 - b) Picking shaft assembly.
 - c) Lap roller drive at comber.
 - d) Ring rail lifting arrangement at R/f.
- 5) Construction & drawing of shedding cam.
- 6) Sheet representing hydraulic, pneumatic, Electrical Electronic symbols and circuits, intrinsic shape component, pipe joints.
- 7) Sheet on machinery and plant layout.
- 8) One sheet drafting with help of computer

REFERENCE BOOKS :-

1. M/c Drawing : N.D. Bhatt
2. -do- : N. Sidheshwar
3. -do- : V.V. Shastri & P.P. Kanhaiya
4. -do- : M.B. Shah
5. Hand Book : IS 696, IS 969.
6. Elements of w/s Technology : Hazra Choudhary