

DEPARTMENT OF LEATHER TECHNOLOGY

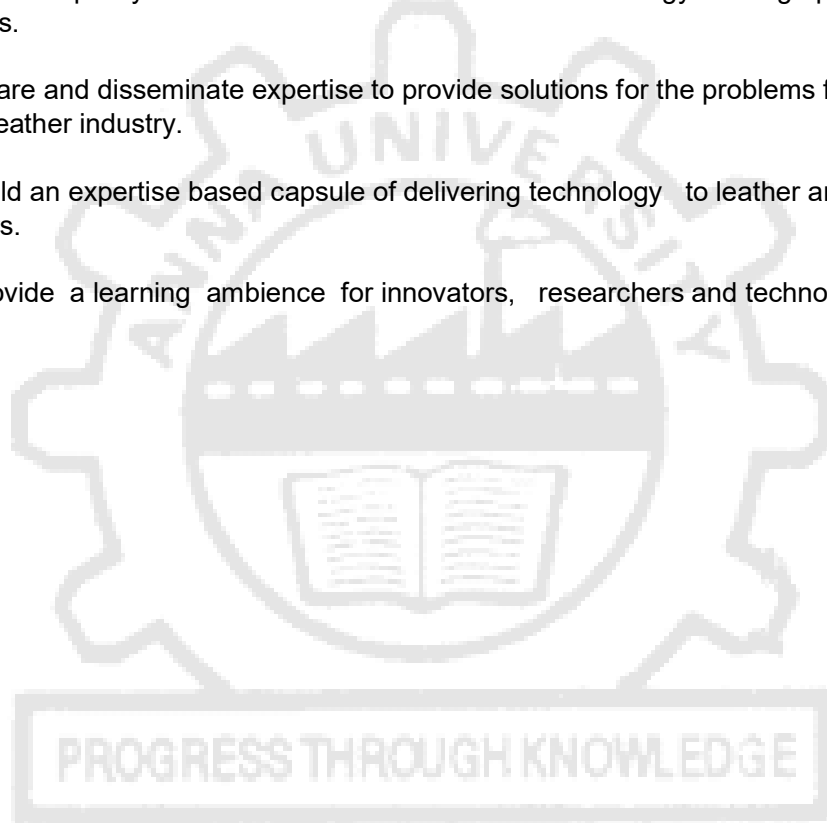
ANNA UNIVERSITY, CHENNAI

Vision:

To become a premier centre of learning and research in Leather and Allied Technology.

Mission:

- MD 1:** To provide quality education in the area of Leather Technology with high professional values.
- MD 2:** To share and disseminate expertise to provide solutions for the problems faced by the Leather industry.
- MD 3:** To build an expertise based capsule of delivering technology to leather and allied sectors.
- MD 4:** To provide a learning ambience for innovators, researchers and technologists.



Attested

ANNA UNIVERSITY::CHENNAI – 600 025
UNIVERSITY DEPARTMENTS
M. TECH. FOOTWEAR ENGINEERING AND MANAGEMENT
REGULATIONS – 2019
CHOICE BASED CREDIT SYSTEM (CBCS)

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

1. To build an expertise base capsule of delivering technology based solution to global footwear sectors.
2. To foster development of advanced human capacity to provide solution in footwear science and engineering.
3. To equip learners with relevant knowledge and expertise system for professional consultation.
4. To enable learners in the areas of pedagogy and advanced research.
5. To provide a learning ambience for innovators researchers and professional technology authors.

2. PROGRAMME OUTCOMES (POs) :

On successful completion of the programme,

PO	Graduate Attribute	Programme Outcome
1	Engineering knowledge	Apply knowledge of mathematics, basic science and engineering science.
2	Problem analysis	Identify, formulate and solve engineering problems.
3	Design/development of solutions	Design a system or process to improve its performance, satisfying its constraints.
4	Conduct investigations of complex problems	Conduct experiments & collect, analyze and interpret the data.
5	Modern tool usage	Apply various tools and techniques to improve the efficiency of the system.
6	The Engineer and society	Conduct themselves to uphold the professional and social obligations.
7	Environment and sustainability	Design the system with environment consciousness and sustainable development.
8	Ethics	Interact in industry, usiness and society in a professional and ethical manner.
9	Individual and team work	Function in a multi disciplinary team.
10	Communication	Proficiency in oral and written Communication.
11	Project management and finance	Implement cost effective and improved system.
12	Life-long learning	Continue professional development and learning as a life-long activity.

3. PROGRAM SPECIFIC OUTCOMES (PSOs):

By the completion of Footwear Science and Engineering Program the student will have following Program specific outcomes.

1.**Foundation:**Knowledge for manning and managing footwear industries.

2.**Communication:**People and social skills required for leadership, consultation and self-employment.

3.**Responsibility:**Professionally ethical behavior and social responsibility of footwear sector.

4.**Design:** Ability to comprehend, analyze, synthesize for design, develop and delivery of converging solutions for industrial problems.

4. PEO / PO MAPPING

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1.	✓	✓		✓	✓				✓			
2.	✓		✓		✓		✓				✓	
3.	✓	✓	✓	✓			✓					
4.								✓	✓	✓		✓
5.						✓		✓	✓			✓

PROGRESS THROUGH KNOWLEDGE

Attested

MAPPING OF COURSES OUTCOMES AND PROGRAMME OUTCOMES

		Course Name	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11	PO 12
YEAR 1	Semester1	Anatomy and Solid Modelling of Foot	✓		✓				✓					
		Technology of Footwear Manufacture	✓	✓	✓				✓					
		Project Management System		✓	✓	✓			✓			✓		
		Orientation to Leather Manufacture (Bridge Course for UG students from non-leather stream)	✓	✓	✓					✓				
		Research Methodology and IPR												
		Audit Course I												
		Testing of Footwear Materials and Products Lab		✓		✓	✓	✓						
	Semester2	Footwear Fabrication Laboratory - I					✓	✓						
		Footwear Components and Accessories		✓	✓	✓		✓						
		Computer Aided Design and Manufacturing for Footwear		✓	✓		✓							
		Footwear Machinery	✓		✓	✓		✓						
		Program Elective I												
		Program Elective II												
		Audit Course II												
Semester3	Footwear Fabrication Laboratory - II					✓	✓							
	CAD/CAM for Footwear Designing		✓	✓		✓								
	Polymers and Auxiliaries for Footwear	✓	✓		✓			✓						
	Program Elective III													
	Program Elective IV													
	Open Elective													
	Internship/Training											✓	✓	
Semester4	Project Phase I		✓		✓				✓			✓	✓	
	Project Phase II		✓		✓				✓			✓	✓	

Attested

ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
M.TECH. FOOTWEAR ENGINEERING AND MANAGEMENT
REGULATION – 2019
CHOICE BASED CREDIT SYSTEM CURRICULUM AND
SYLLABI FOR I TO IV SEMESTER

SEMESTER I

Sl. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	FW5101	Anatomy and Solid Modelling of Foot	PCC	3	2	1	0	3
2.	FW5102	Technology of Footwear Manufacture	PCC	3	3	0	0	3
3.	LE5151	Project Management Systems	PCC	3	3	0	0	3
4.	LE5152	Orientation to Leather Manufacture (Bridge Course)*	PCC	3	3	0	0	0
5.	RM5151	Research Methodology and IPR	RMC	2	2	0	0	2
6.		Audit Course I**	AC	2	2	0	0	0
PRACTICALS								
7.	FW5111	Testing of Footwear Materials and Products Lab	PCC	6	0	0	6	3
8.	FW5112	Footwear Fabrication Laboratory - I	PCC	6	0	0	6	3
TOTAL				28	15	1	12	17

* Compulsory for Non-Leather UG graduates

** Audit Course is Optional

SEMESTER II

Sl. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	FW5201	Footwear Components and Accessories	PCC	3	3	0	0	3
2.	FW5202	Computer Aided Design and Manufacturing for Footwear	PCC	3	3	0	0	3
3.	FW5203	Footwear Machinery	PCC	3	3	0	0	3
4.		Program Elective I	PEC	3	3	0	0	3
5.		Program Elective II	PEC	3	3	0	0	3
6.		Audit Course II*	AC	2	2	0	0	0
PRACTICALS								
7.	FW5211	Footwear Fabrication Laboratory - II	PCC	6	0	0	6	3
8.	FW5212	CAD/CAM for Footwear Designing	PCC	6	0	0	6	3
TOTAL				29	17	0	12	21

* Audit Course is Optional

SEMESTER III

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	FW5301	Polymers and Auxiliaries for Footwear	PCC	3	3	0	0	3
2.		Program Elective III	PEC	3	3	0	0	3
3.		Program Elective IV	PEC	3	3	0	0	3
4.		Open Elective	OEC	3	3	0	0	3
PRACTICALS								
5.	FW5311	Internship/Training	EEC	4	0	0	4	2
6.	FW5312	Project Phase I	EEC	12	0	0	12	6
TOTAL				28	12	0	16	20

SEMESTER IV

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
PRACTICALS								
1.	FW5411	Project Phase II	EEC	24	0	0	24	12
TOTAL				24	0	0	24	12

TOTAL NO. OF CREDITS: 70

PROGRAM CORE COURSES (PCC)

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	FW5101	Anatomy and Solid Modelling of Foot	PCC	3	2	1	0	3
2.	FW5102	Technology of Footwear Manufacture	PCC	3	3	0	0	3
3.	LE5151	Project Management Systems	PCC	3	3	0	0	3
4.	FW5111	Testing of Footwear Materials and Products Lab	PCC	6	0	0	6	3
5.	FW5112	Footwear Fabrication Laboratory - I	PCC	6	0	0	6	3
6.	FW5201	Footwear Components and Accessories	PCC	3	3	0	0	3
7.	FW5202	Computer Aided Design and Manufacturing for Footwear	PCC	3	3	0	0	3
8.	FW5203	Footwear Machinery	PCC	3	3	0	0	3
9.	FW5211	Footwear Fabrication Laboratory – II	PCC	6	0	0	6	3
10.	FW5212	CAD/CAM for Footwear Designing	PCC	6	0	0	6	3
11.	FW5301	Polymers and Auxiliaries for Footwear	PCC	3	3	0	0	3

Attested

BRIDGE COURSE

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	LE5152	Orientation to Leather Manufacture (For B.E Mechanical, Production, Industrial Engg. Students)	PCC	3	3	0	0	0

PROFESSIONAL ELECTIVES COURSES (PEC)

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	FW5001	Computational Methods and Computer Graphics	PEC	3	3	0	0	3
2.	LE5071	Corporate Social Responsibility	PEC	3	3	0	0	3
3.	LE5074	Engineering Economics in Production	PEC	3	3	0	0	3
4.	FW5002	Footwear Performance and Customer Services	PEC	3	3	0	0	3
5.	FW5003	Gait Analysis	PEC	3	2	1	0	3
6.	FW5004	Human Factors in Engineering	PEC	3	3	0	0	3
7.	LE5072	Industrial Safety and Occupational Health	PEC	3	3	0	0	3
8.	FW5005	Marketing Management	PEC	3	3	0	0	3
9.	FW5006	Materials Science	PEC	3	3	0	0	3
10.	FW5007	Modern Footwear Styling	PEC	3	3	0	0	3
11.	FW5008	Organization and Management of Footwear Sector	PEC	3	3	0	0	3
12.	FW5009	Pedorthic Footwear	PEC	3	3	0	0	3
13.	FW5010	Production Operations Management	PEC	3	3	0	0	3
14.	FW5011	Quality Control Management in Footwear Industries	PEC	3	3	0	0	3
15.	LE5073	Self-Management and Entrepreneurship	PEC	3	3	0	0	3
16.	FW5012	Technology for Specialty and Non – Leather Footwear	PEC	3	3	0	0	3

Attested

PROFESSIONAL ELECTIVE STREAMS

In order to build an expertise base for technology management for footwear sector with scope of super specialization four different streams namely Industrial Project Planning and Development, Total Quality and Productivity Management, Research and Development and Pedagogy and Precision and Product Design and Engineering, it is proposed to create four elective streams.

- a) Industrial Project Planning and Development
- b) Total Quality and Productivity Management
- c) Research & Development and Pedagogy
- d) Precision and Product Design and Engineering

Students are expected to choose any one the streams depending on their interest and capabilities. From the list of Professional Elective Courses, about 7 courses are proposed for each stream and students are expected to choose any 4 courses.

a) Industrial Project Planning and Development

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	LE5074	Engineering Economics in Production	PEC	3	3	0	0	3
2.	LE5072	Industrial Safety and Occupational Health	PEC	3	3	0	0	3
3.	FW5007	Modern Footwear Styling	PEC	3	3	0	0	3
4.	FW5010	Production Operations Management	PEC	3	3	0	0	3
5.	FW5005	Marketing Management	PEC	3	3	0	0	3
6.	LE5073	Self-Management and Entrepreneurship	PEC	3	3	0	0	3
7.	LE5071	Corporate Social Responsibility	PEC	3	3	0	0	3
8.	FW5008	Organization and Management of Footwear Sector	PEC	3	3	0	0	3

Attested

b) Total Quality and Productivity Management

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	FW5011	Quality Control Management in Footwear Industries	PEC	3	3	0	0	3
2.	LE5074	Engineering Economics in Production	PEC	3	3	0	0	3
3.	FW5002	Footwear Performance and Customer Service	PEC	3	3	0	0	3
4.	FW5004	Human Factors in Engineering	PEC	3	3	0	0	3
5.	LE5072	Industrial Safety and Occupational Health	PEC	3	3	0	0	3
6.	FW5008	Organization and Management of Footwear Sector	PEC	3	3	0	0	3
7.	LE5073	Self-Management and Entrepreneurship	PEC	3	3	0	0	3
8.	FW5007	Modern Footwear Styling	PEC	3	3	0	0	3

c) Research and Development and Pedagogy

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	LE5072	Industrial Safety and Occupational Health	PEC	3	3	0	0	3
2.	FW5003	Gait Analysis	PEC	3	2	1	0	3
3.	FW5006	Material Science	PEC	3	3	0	0	3
4.	FW5007	Modern Footwear Styling	PEC	3	3	0	0	3
5.	FW5008	Organization and Management of Footwear Sector	PEC	3	3	0	0	3
6.	FW5009	Pedorthic Footwear	PEC	3	3	0	0	3
7.	FW5012	Technology for Specialty and Non – Leather Footwear	PEC	3	3	0	0	3

Attested

d) Precision and Product Design Engineering

S.NO	COURSE CODE	COURSE TITLE	CATE GORY	CONATCT PERIODS	L	T	P	C
1.	FW5001	Computational Methods and Computer Graphics	PEC	3	3	0	0	3
2.	FW5008	Organization and Management of Footwear Sector	PEC	3	3	0	0	3
3.	FW5003	Gait Analysis	PEC	3	2	1	0	3
4.	LE5072	Industrial Safety and Occupational Health	PEC	3	3	0	0	3
5.	FW5007	Modern Footwear Styling	PEC	3	3	0	0	3
6.	FW5010	Production Operations Management	PEC	3	3	0	0	3
7.	FW5012	Technology for Specialty and Non – Leather Footwear	PEC	3	3	0	0	3

RESEARCH METHODOLOGY AND IPR COURSE (RMC)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	RM5151	Research Methodology and IPR	RMC	2	2	0	0	2

OPEN ELECTIVE COURSES (OEC)*

*(Out of 6 Courses one Course must be selected)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	OE5091	Business Data Analytics	OEC	3	3	0	0	3
2.	OE5092	Industrial Safety	OEC	3	3	0	0	3
3.	OE5093	Operations Research	OEC	3	3	0	0	3
4.	OE5094	Cost Management of Engineering Projects	OEC	3	3	0	0	3
5.	OE5095	Composite Materials	OEC	3	3	0	0	3
6.	OE5096	Waste to Energy	OEC	3	3	0	0	3

Attested

AUDIT COURSES (AC)

Registration for any of these courses is optional to students

S. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS	SEMESTER
			Lectur	Tutorial	Practical		
1.	AX5091	English for Research Paper Writing	2	0	0	0	1/2
2.	AX5092	Disaster Management	2	0	0	0	
3.	AX5093	Sanskrit for Technical Knowledge	2	0	0	0	
4.	AX5094	Value Education	2	0	0	0	
5.	AX5095	Constitution of India	2	0	0	0	
6.	AX5096	Pedagogy Studies	2	0	0	0	
7.	AX5097	Stress Management by Yoga	2	0	0	0	
8.	AX5098	Personality Development Through Life Enlightenment Skills	2	0	0	0	
9.	AX5099	Unnat Bharat Abhiyan	2	0	0	0	

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
1.	FW5312	Project Phase I	EEC	12	0	0	12	6
2.	FW5411	Project Phase II	EEC	24	0	0	24	12
3.	FW5311	Industrial Internship	EEC	4	0	0	4	2

SUMMARY

S. No.	SUBJECT AREA	EDITS PER SEMESTER				CREDITS TOTAL
		I	II	III	IV	
1.	PROGRAM CORE COURSES	15	15	3	0	33
2.	PROFESSIONAL ELECTIVES COURSES	0	6	6	0	12
3.	OPEN ELECTIVE COURSES	0	0	3	0	3
4.	EMPLOYABILITY ENHANCEMENT COURSES	0	0	8	12	20
5.	RESEARCH METHODOLOGY AND IPR COURSE	2	0	0	0	2
6.	AUDIT COURSE (Non Credit)	0	0	0	0	0
Total Credit		17	21	20	12	70

Attested

SYLLABI
SEMESTER I

FW5101	ANATOMY AND SOLID MODELLING OF FOOT	L	T	P	C
		2	1	0	3

OBJECTIVE

The objective of this course is to provide the fundamental knowledge about foot and its modelling

UNIT I ANATOMY OF HUMAN FOOT 9

Lower limb - bones, muscles, nerves and fascia, their functions in structural stability (static & dynamic) muscles in helping in walking, muscle relate to limb functions like flexion, extension, etc. Science in Shoe Design.

UNIT II GROWTH AND DEFORMITIES 7

Growth of foot from infancy to maturity, arches of foot, relationship between foot shape and last. Different types of foot deformities like PesCavus, Valgus, Blisters, Gangrene, injuries in sports, methods of prevention etc., Footcare and protection

UNIT III PRINCIPLES OF BIO MECHANICS 7

Reference planes of motion; Kinematics; Limb Movements; Motion of Joints; Kinetics; Force; Momentum; Inertia; Pressure; Torque; Work, Power and Energy. Free body diagram, analysis - biomechanics of walking, running.

UNIT IV FUNDAMENTALS OF GAIT 7

Terminology used in Gait; Gait Parameters Definition; Phases of Gait Cycle; Fundamentals in Gait Analysis; Balance and Posture; Ground Reaction Force. Introduction to gait analysis techniques.

UNIT V SOLID MODELLING 15

Basic principles of solid modelling and surface modelling using contours and geometry. Use of solid modelling in designing and developing modern footwear. Introduction to Foot Anthropometry; Design of anthropometric foot surveys; Data collection and Statistical Analysis of foot data; Establishment of Sizing systems.

Lasts: Different measurement of feet and lasts - methods, units, sizing systems such as English, French, American, German, Japan Mondo-point their conversion and comparison. Materials for last making, manufacturing technique. Model development. Principles of grading - Manual, machine and computer grading.

TOTAL :45 PERIODS

OUTCOMES:

At the end of this course the students will be able

- CO1. To understand anatomy of human lower limb
- CO2. To have knowledge on principles of biomechanics of foot
- CO3. Aware of solid modelling of foot.

Attested

REFERENCES:

1. Chaurasia, B.D., "Human Anatomy: Regional and Human Osteology", 7th Edition, CBS Publishers and Distributors, New Delhi. 2016.
2. Hollinshead, H., "Text book of Anatomy", LWW Publishers, 5th Revised Edition (1997) Oxford IBH London.
3. Morton, D.J., "The Human Foot", Hafner Publishing Co., New York, London, 1964.
4. Thornton, J.H., "Text book of Footwear Manufacture", National Trade Press Ltd., London, 1970
5. Edwards, C.A., "Orthopaedic shoe technology", Precision Printing Co., Indiana, 1981
6. Whittle, M., "Gait Analysis: An introduction," Butterworth – Heinemann Publication, 2007.
7. Vincent G Duffy, "Digital Human Modelling", Springer, July 2011

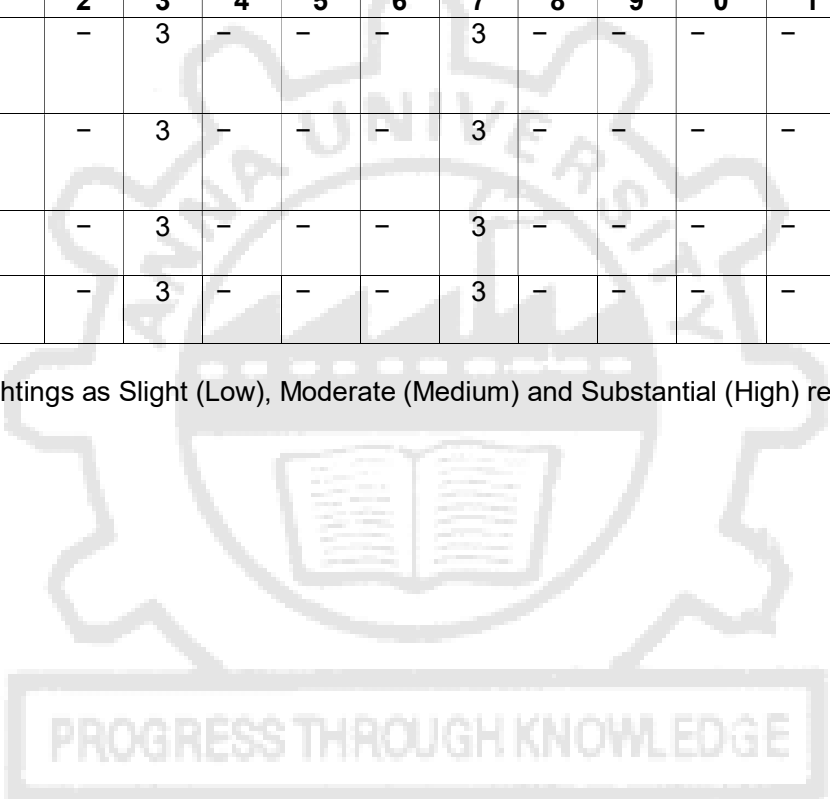


Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	To understand anatomy of human lower limb	3	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3
CO2	To have knowledge on principles of biomechanics of foot	3	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3
CO3	Aware of solid modelling of foot.	3	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3
Anatomy and Solid Modelling of Foot		3	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

The objective of this course is to present the students on various unit operations in footwear manufacture.

UNIT I DESIGN AND PATTERN DEVELOPMENT 7

History of shoe – purposes and styles – fashions & designs – selection criteria for last, Forming, conceptual design (Manual & Computer) - Grading Preparation of bottom and insole patterns – Preparation of standards and section for Men, Ladies & Children classic and other types of shoes and boots.

UNIT II CUTTING 7

Selection of materials – Layout preparation – Materials Economy - Principles of cutting – Hand, machine, Scope for automation, Standard time – Quality Control – Clicking room design and management. Fabric, rolls and sheet materials cutting technique.

UNIT III PRE-CLOSING AND CLOSING 11

Checking incoming work, stitch making, skiving, punching and gimping, heat embossing, flow moulding, toe puff attachment, attaching linings and scrim, trimming linings, finishing off closed seams. Top line and other edge treatments, local reinforcements, attaching fasteners and trims. Threads, needles, Seam and stitch types, preparing for stitching, Dealing with thread breakages, automatic stitching, working environment faults and remedies, Types of stitching machines, Design of assembly section and Stitching machine management.

UNIT IV LASTING 9

Principles and methods of pre lasting and lasting operation – Manual and mechanical method. Effect of temperature, humidity and materials in lasting and making operations. Types of machinery and the principles involved in mechanical operations. Bottom stock preparation

UNIT V POST LASTING AND FINISHING 11

Principles and methods of various post lasting and finishing operation ; Sole attaching –preparation of lasted margin, upper preparation, sole preparation, sole cementing, uppercementing, halogenations; bottom fillers and shanks adhesive drying, heat activation, spotting,pressing, last slipping, health and safety, quality control and fault finding problems- solving,recommended bonding systems. Shoe room techniques.

TOTAL: 45 PERIODS**OUTCOMES:**

At the end of this course, the students are expected to

- CO1. Understand the construction of a shoe and its components.
- CO2. Understand the design and pattern development.
- CO3. Have knowledge on prelasting and lasting.

Attested

REFERENCES:

1. Patrick, H.J., "Modern pattern cutting and design", Mobbs and Lewis Ltd., Kettering, England, 1990.
2. Lyon, D., "Modern approach to Footwear pattern cutting", 1994.
3. Thornton, J.H., "Text book of Footwear Manufacture", National Trade Press Ltd., London, 1970.
4. "Manual of Shoe Making" – Clarks Ltd. (London) 2nd edition, 1989.
5. Wilhelm, A., "Tips for shoe production" Vol. I, II & III, HuthigBuchVerlag, Heidelberg, 1988.

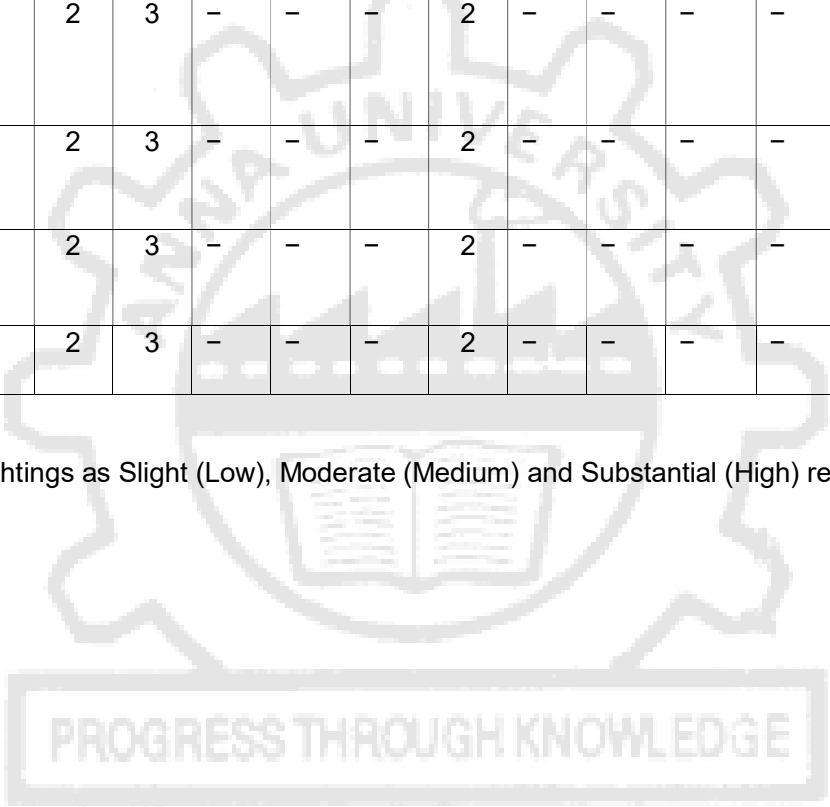


Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the construction of a shoe and its components.	2	2	3	-	-	-	2	-	-	-	-	-	2	2	-	3
CO2	Understand the design and pattern development.	2	2	3	-	-	-	2	-	-	-	-	-	2	2	-	3
CO3	Have knowledge on prelisting and lasting.	2	2	3	-	-	-	2	-	-	-	-	-	2	2	-	3
Technology of Footwear Manufacture		2	2	3	-	-	-	2	-	-	-	-	-	2	2	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



Attested
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[Signature]
DIRECTOR
Centre for Academic Courses
Anna University, Chennai-600 025

LE5151	PROJECT MANAGEMENT SYSTEMS	L	T	P	C
	“Syllabus is in Common with M.Tech (Leather Technology) Programme”	3	0	0	3

OBJECTIVE

The purpose of this subject is to identify; formulate; foresee or predict problems as possible; and to plan, organize, control activities of the project to complete it successfully in spite of all risks

UNIT I PROJECT IDENTIFICATION AND FORMULATION 10

Project Identification Analysis: Concept of Project, Search for Business Idea, Project Identification, Project Planning Formulation and Analysis, Project Screening and Presentation of Projects for Decision Making; Socio-economic Consideration in Project Formulation; Social Infrastructure Projects for Sustainable Development; Investment Opportunities. Project Life Cycle, Feasibilities of Projects-Different forms of Project Contracting.

UNIT II PROJECT BUDGETING AND FINANCING 9

Capital Investments and Difficulties, Types of Capital Investment, Phase of Capital Budgeting, Facets of Project Analysis, Financial Estimates and Deductions, Estimation of Project Cash Flows.

Social Cost Benefit Analysis – Rational for SCBA, UNIDO Approach, Multiple Project and Constraints – Linear Programming Model, Financing of Projects – Different Kind of Project Finance.

UNIT III PROJECT APPRAISAL AND RISK ANALYSIS 8

Project Appraisal: Time Value of Money; Project Appraisal Techniques –Payback Period, Accounting Rate of Return, Net Present Value, Internal Rate of Return, Benefit Cost Ratio; Social Cost Benefit Analysis; Effective Rate of Return.

Risk Analysis: Measures of Risk; Sensitivity Analysis; Stimulation Analysis; Decision Tree Analysis.

UNIT IV PROJECT DESIGN AND EVALUATION 7

Project Design – Logic Model – Creating Work Break Down Structure (WBS) – Project Roll– up, Process Break down Structure, Responsibility Matrix, Cost of Capital, Project Control Process, Performance Measurement, Evaluation, Planning Audit, Post Completion Audit.

UNIT V PROJECT SCHEDULING TOOLS AND TECHNIQUES 11

Critical Path Method (CPM); Critical Chain Method; Schedule Compression Techniques – Crashing – Fast Tracking; Resource Optimization Techniques – Leveling – Balancing; Modelling Techniques – What- if Analysis – Simulation; Leads and Lags; Scheduling tools; Schedule network Analysis.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students can

- CO1. Successfully develop and implement all project’s procedures.
- CO2. Achieve project’s main goal within the given constraints.
- CO3. Develop techniques to manage and coordinate project managers, subcontractors, customers, team members and vendors.
- CO4. Identify various implementation techniques.
- CO5. Describe ways to manage scope in a rapidly changing business environment.

Attested

REFERENCES:

1. Projects – Planning, Analysis Selection, Finance, Implementation and Review by Dr. PrasannaChandra , Tata McGraw Hill Education (2009)7th Edition.
2. Project Management – Clifford F. Gray & Erik Larson, McGraw Hill Higher Education; 3rd Edition (2005)
3. Project Management: A Managerial Approach by Jack R. Meredith ,Samuel J. Mantel Jr , Wiley; 8th edition (2011)
4. The Practice and Theory of Project Management: Creating Value Through Change Richard Newton Basingstoke, Hampshire: Palgrave Macmillan, 2009.
5. Effective Project Management - James P. Clements, Jack Gido , South-Western Cengage Learning, 2012



Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Successfully develop and implement all project's procedures.	-	3	3	3	-	3	-	-	3	-	-	-	3	3	3	-
CO2	Achieve project's main goal within the given constraints.	-	3	3	3	-	3	-	-	3	-	-	-	3	3	3	-
CO3	Develop techniques to manage and coordinate project managers, sub contractors, team members and vendors.	-	3	3	3	-	3	-	-	3	-	-	-	3	3	3	-
CO4	Identify various implementation techniques.	-	3	3	3	-	3	-	-	3	-	-	-	3	3	3	-
CO5	Describe ways to manage scope in a rapidly changing business environment.	-	3	3	3	-	3	-	-	3	-	-	-	3	3	3	-
Project Management System		-	3	3	3	-	3	-	-	3	-	-	-	3	3	3	-

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

Attested
20 | Page


DIRECTOR
Centre for Academic Courses
Anna University, Chennai-600 025

LE5152	ORIENTATION TO LEATHER MANUFACTURE	L T P C
	[Bridge Elective Course for Non-Leather UG Graduates]	3 0 0 0
	“Syllabus is Common with M.Tech (Leather Technology) Programme”	

OBJECTIVE

This course objective is to orient the non-leather students on the fundamental science and technology of leather manufacture.

UNIT I HIDES, SKINS and PRESERVATION 7

Origin and characteristics of hides and skins; Categories of livestock; Grading systems; Defects in hides and skins; Various preservation techniques and their principles.

UNIT II PRETANNING PROCESSES AND OPERATIONS 8

Principles and objectives of beam house processes viz., soaking, liming, reliming, deliming, bating, pickling, depickling and degreasing; Various unit operations in pretanning.

UNIT III TANNING 10

Definition and objectives of tanning; Types and basic chemistry of vegetable tannins; Basic chemistry of basic chromium sulfate; Principles involved in vegetable and chrome tanning and their mechanism in brief; Combination tannages.

UNIT IV POST TANNING PROCESSES AND OPERATIONS 10

Principles and objectives of post tanning processes viz., neutralisation, retanning, dyeing and fatliquoring; Various unit operations involved.

UNIT V FINISHING TECHNIQUES 10

Types of binders; Basic chemistry of protein, resin and PU binders; Types of pigments; Basic characteristics of pigments; Basic theory of coating; Principles and objectives of finishing; Classification of finishing; Types of auxiliaries and finishes.

TOTAL : 45 PERIODS

OUTCOME

At the end of the course, students are expected to

CO1. Understand the application and alternatives to leather in current global scenario.

CO2. Have knowledge on pretanning, tanning and post tanning processes.

CO3. Comprehend the process rational for making specific leather.

REFERENCES:

1. Sarkar, K.T., "Introduction to the Principles of Leather Manufacture", Ajoy Sorcor, Madras, 1981.
2. Dutta, S.S., "Introduction to the Principles of Leather Manufacture", Indian Leather Technologists Association, Calcutta, 1980.
3. Thorstenson, T.C., "Practical Leather Technology", Robert E. Krieger Publishing Co., Malabar, Florida, 1985.
4. Fred O Flaherty, Roddy, T.W. and Lollar, R.M., "The Chemistry and Technology of Leather", Vol.I& II, Type of tannages, Rober E. Krieger Publishing Co., New York, 1977.
5. Tchobanoglous, G., Burton, F.L. and Stensel, H.D. (Eds), "Waste water Engineering,treatment, disposal and reuse: Metcalf and Eddy", 3rd edn. Tata-McGraw Hill Publishing, NewDelhi, 1991.

Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the application and alternatives to leather in current global scenario	3	3	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	Have knowledge on pretanning, tanning and post tanning processes.	3	3	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO3	Comprehend the process rational for making specific leather.	3	3	3	-	-	-	3	-	-	-	-	-	-	-	-	-
Orientation to Leather Manufacture		3	3	3	-	-	-	3	-	-	-	-	-	-	-	-	-

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



COURSE OBJECTIVES:

To impart knowledge and skills required for research and IPR:

- Problem formulation, analysis and solutions.
- Technical paper writing / presentation without violating professional ethics
- Patent drafting and filing patents.

UNIT I RESEARCH PROBLEM FORMULATION 6

Meaning of research problem- Sources of research problem, criteria characteristics of a good research problem, errors in selecting a research problem, scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations

UNIT II LITERATURE REVIEW 6

Effective literature studies approaches, analysis, plagiarism, and research ethics.

UNIT III TECHNICAL WRITING /PRESENTATION 6

Effective technical writing, how to write report, paper, developing a research proposal, format of research proposal, a presentation and assessment by a review committee.

UNIT IV INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS (IPR) 6

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT V INTELLECTUAL PROPERTY RIGHTS (IPR) 6

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TOTAL HOURS: 30**COURSE OUTCOMES:**

1. Ability to formulate research problem
2. Ability to carry out research analysis
3. Ability to follow research ethics
4. Ability to understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity
5. Ability to understand about IPR and filing patents in R & D.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓											
CO3	✓							✓				
CO4	✓				✓							
CO5	✓					✓						✓

Attested

REFERENCES:

1. Asimov, "Introduction to Design", Prentice Hall, 1962.
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
3. Mayall, "Industrial Design", McGraw Hill, 1992.
4. Niebel, "Product Design", McGraw Hill, 1974.
5. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners" 2010



Attested

OBJECTIVE

The objective of this course is provide practical exposure on the testing of footwear materials

- Methods of sampling and conditioning of footwear materials and end products.
- Physical analysis of leather upper, lining, toe-puff / stiffener, insole and sole.
- Demonstration of Chemical Testing of Leather for Footwear Manufacturing
- Physico-mechanical properties of non-leather upper and lining materials and coated fabrics-pH and chloride content
- Physico - mechanical properties of rigid Cellulose, Woven and Non-Woven
- Testing of Insole
- Visual and physico mechanical tests like seam strength, strap strength, Toe load, Heel pull-off (ladies), top-line strength, water resistance etc.
- Testing of footwear grinders and accessories.
- Testing of safety shoe.

TOTAL: 90 PERIODS

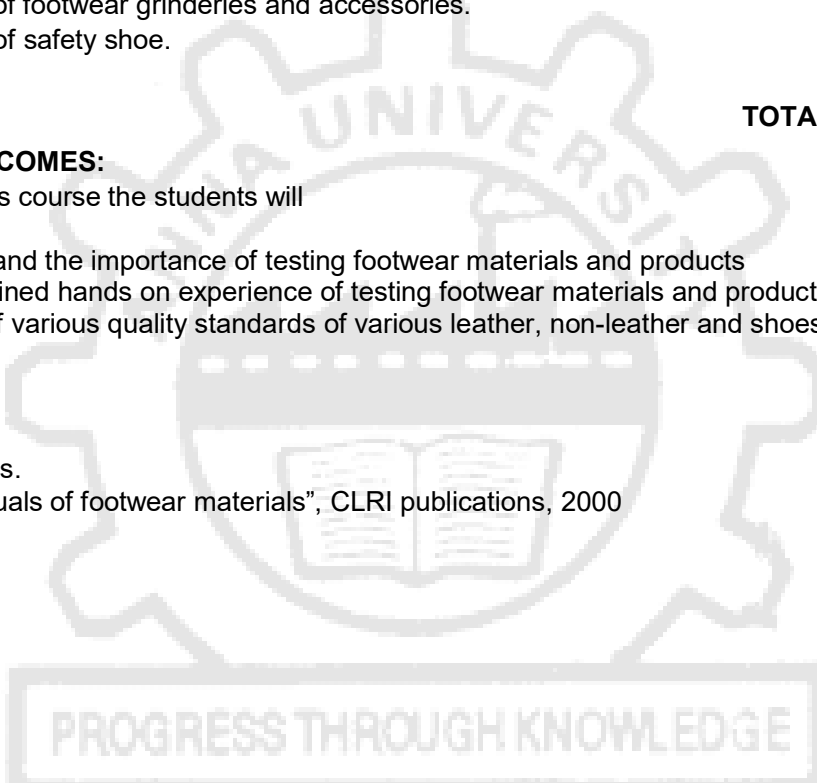
COURSE OUTCOMES:

At the end of this course the students will

- CO1. Understand the importance of testing footwear materials and products
- CO2. Have gained hands on experience of testing footwear materials and products
- CO3. Aware of various quality standards of various leather, non-leather and shoes

REFERENCES:

1. BIS Standards.
2. "Quality manuals of footwear materials", CLRI publications, 2000



Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the importance of testing footwear materials and products	-	3	-	2	2	3	-	-	-	-	-	-	2	-	-	3
CO2	Have gained hands on experience of testing footwear materials and products	-	3	-	2	2	3	-	-	-	-	-	-	2	-	-	3
CO3	Aware of various quality standards of various leather, non-leather and shoes	-	3	-	2	2	3	-	-	-	-	-	-	2	-	-	3
Testing of Footwear Materials and Products Lab		-	3	-	2	2	3	-	-	-	-	-	-	2	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

To impart practical exposure in Pattern developments and cutting operation

UNIT I LAST**45**

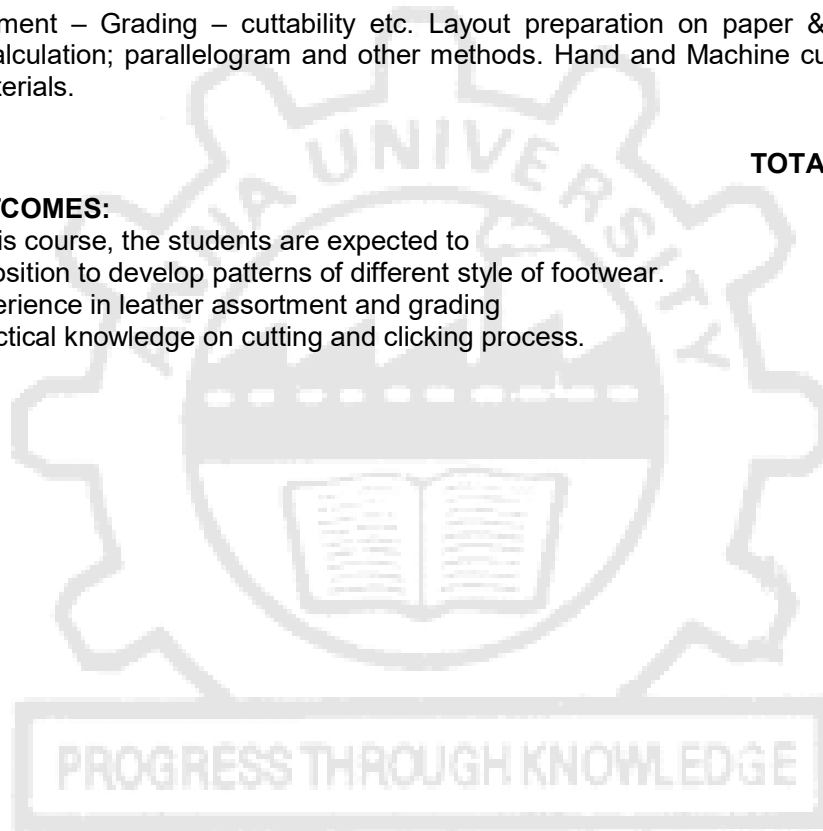
Central line drawing – Measurements – Design Insole pattern – Sole pattern – Forming – slotted, Fabric, Tape & Vacuum Method. Men's shoe standard and preparation (Derby, Oxford, Mocassins, Ankle boots, long boots etc.) Ladies & Children's standard and section preparation.

UNIT II CUTTING AND CLICKING**45**

Leather Assortment – Grading – cuttability etc. Layout preparation on paper & leather. Leather consumption calculation; parallelogram and other methods. Hand and Machine cutting Fabric and other sheet materials.

TOTAL: 90 PERIODS**COURSE OUTCOMES:**

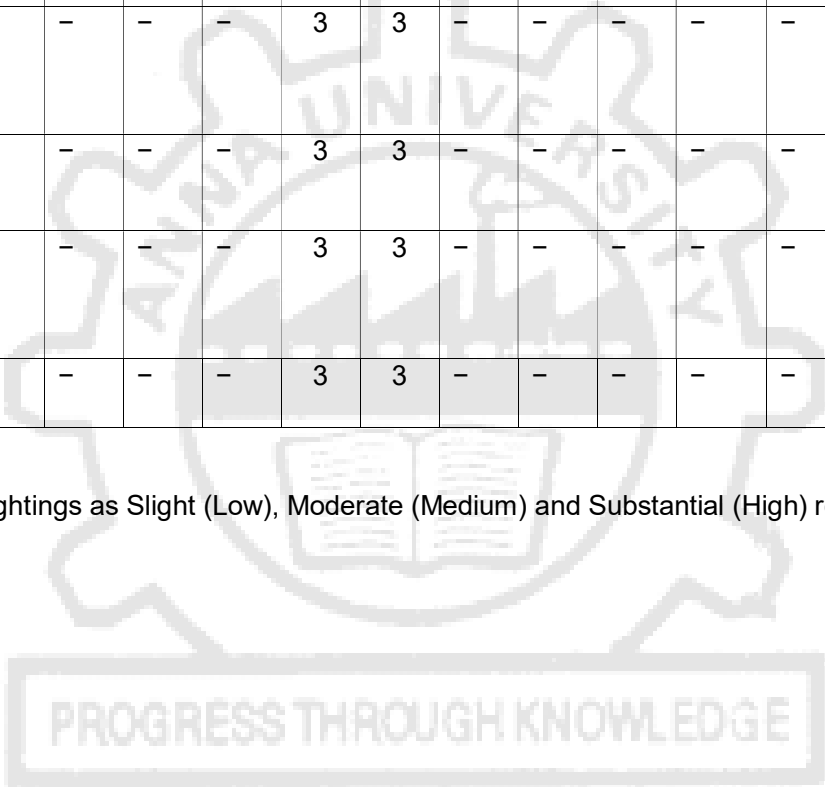
At the end of this course, the students are expected to
CO1. Be in a position to develop patterns of different style of footwear.
CO2. Gain experience in leather assortment and grading
CO3. Have practical knowledge on cutting and clicking process.

*Attested*

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Be in a position to develop patterns of different style of footwear	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3
CO2	Gain experience in leather assortment and grading	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3
CO3	Have practical knowledge on cutting and clicking process.	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3
Footwear Fabrication Laboratory - I		-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



SEMESTER II

FW5201	FOOTWEAR COMPONENTS AND ACCESSORIES	L	T	P	C
		3	0	0	3

OBJECTIVE

The objective of this course is provide the students with the knowledge on various components and accessories used for footwear manufacture

UNIT I COMPONENTS 9

Insole: Raw material - Kind of insoles: Leather Board of stock preparation - Board making. Heel: Injection moulded heels: mould design, raw materials selection - injection moulding and finishing.

UNIT II GRINDERIES 13

Last: Raw material - Manufacture of wooden last, Plastic last and metal last.
Constituents and Manufacture of fibreboards. Plastic back part insole and stiffener board. Shank, Raw Material - Wood, Fibre board Steel, combined wooden board or steel and board, manufacture technique.
Grinderies: Metallic grinderies - tack, rivet and nails, wires - raw materials - sorting and polishing.

UNIT III FASTENERS 9

Fasteners: Threads, Lace Fabrics: Raw Material – Manufacture Technique and Finishing. Eyelets: Raw materials - designing and manufacturing processes.
Slide fasteners: Types of materials used in slide fasteners - manufacturing processes.

UNIT IV ACCESSORIES 5

Ornaments, embellishments, studs, methods of manufacture, moulding, electroplating and polishing.

UNIT V REINFORCEMENTS 9

Toe-puff and Stiffeners: Types of Toe-puff and stiffeners, manufacture techniques - Paint on liquids, impregnated fabrics, print on hot-melt resin, filmic. Recommended use. Non-metallic grinderies: Reinforcement tape - tape preparation - Vulcanization of adhesive. Fibre fastening, Velcro, etc.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course the students will be able

- CO1. To understand about various footwear components
- CO2. Have practical knowledge on characteristics of various footwear components and accessories
- CO3. Have knowledge on different manufacturing techniques of accessories

REFERENCES:

1. Thornton, J.H., "Text book of Footwear Materials", The National Trade Press Ltd., London, 1970.
2. Harvey, A.J., "Footwear Materials and Process Technology", N.Z. Leather & Shoe Research Association, New Zealand, 1982.

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	To understand about various footwear components	-	3	3	3	-	3	-	-	-	-	-	-	2	-	-	-
CO2	Have practical knowledge on characteristics of various footwear components and accessories	-	3	3	3	-	3	-	-	-	-	-	-	2	-	-	-
CO3	Have knowledge on different manufacturing techniques of accessories	-	3	3	3	-	3	-	-	-	-	-	-	2	-	-	-
Footwear Components and Accessories		-	3	3	3	-	3	-	-	-	-	-	-	2	-	-	-

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



FW5202	COMPUTER AIDED DESIGN AND MANUFACTURING FOR FOOTWEAR	L	T	P	C
		3	0	0	3

OBJECTIVE

The objective of this course is project the use of computer assisted designing techniques for making footwear

UNIT I COMPUTER APPLICATIONS IN FOOTWEAR SECTOR 3

Definition, historical development, scope of applications and advantage.

UNIT II HARDWARE IN CAD 12

Introduction, Principles, Capabilities and operation of graphical workstations, central processing units, graphic terminals, input/output devices, interface and storage devices, net-working concepts of LAN and WAN.

Digitization : 2D & 3D Coordinate extracting, principles of digital and analog conversion, digital input/output processing systems. CNC devices for computer aided cutting including laser and water jet, computer aided manufacturing.

UNIT III PATTERN ENGINEERING 8

Computerized techniques for pattern generation, grading and assessment of footwear patterns, consumption calculations, pattern nesting and costing, stitching etc. through computerized techniques.

Data Conversion techniques, DXF.

UNIT IV LAST MODELLING 10

Digitization with 3D Scanner; manipulation and optimization of digitized last; use of macros; last comparison; grading wizard; flattening; 3D visualization of last and styles; concept of e-last; introduction to sole and sole mould design.

UNIT V ADVANCED COMPUTATIONAL TECHNIQUES IN CAD, RAPID PROTOTYPING 12

Principles and practice of foot scanner; conversion of foot dimensions to last model; creation of still files for last manufacture; simulation – concepts and applications; robotics: concepts and applications in footwear manufacture; 3D Printing : concepts and applications in footwear manufacture.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of the course students are expected to

CO1. Understand the concepts of computer applications in footwear sector.

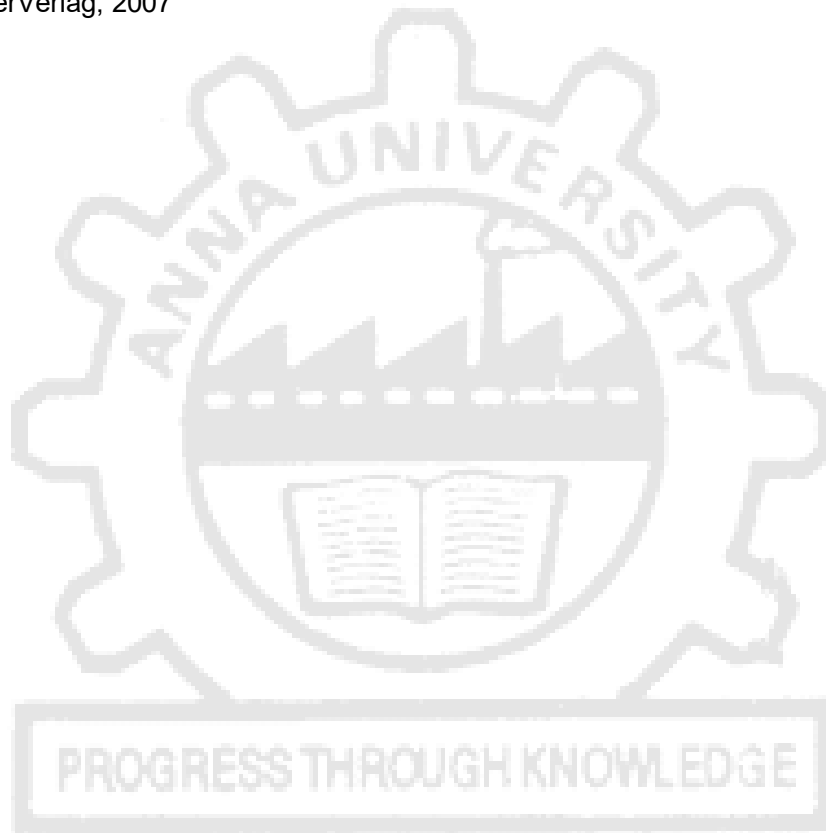
CO2. Have knowledge on CAD for pattern engineering, last and sole modelling for footwear.

CO3. Have knowledge in advanced computational techniques in CAD, rapid prototyping, simulation, 3D printing and robotics

Attested

REFERENCES:

1. Groover, M.P. and Zinimers, M.P., "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India, 1984.
2. Newman and Sul, S.P., "Introduction to Computer Graphics", Published by Morgan Kaufmann, 1995
3. Zandi, "Computer Aided Design and drafting", Published by Delmer, 1985.
4. Pratt, W., "Digital Image Processing", 1978.
5. Desai and Abel, "Introduction to FEM".
6. "Step by Step guide to CAD for footwear": CAD Centre, SDDC, CLRI.
7. Rapidprototyping; AU – FRG publications, 1984.
8. Buchner, J., "Simulation: QUEST manual" : EDS Technologies, Published by Springer, 2003.
9. Mass Customization And Footwear: Myth, Salvation Or Reality?: A Comprehensive Analysis Of The Adoption Of The Mass Customization Paradigm In Footwear by Claudio R.Bor, Sergio Dulio; SpringerVerlag, 2007



Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the concepts of computer applications in footwear sector.	-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO2	Have knowledge on CAD for pattern engineering, last and sole modelling for footwear.	-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO3	Have knowledge in advanced computational techniques in CAD, rapid prototyping, simulation, 3D printing and robotics	-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
Computer Aided Design and Manufacturing for Footwear		-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

OBJECTIVE

To impart theory and practical knowledge on the working principles, use and maintenance of machineries used in Footwear manufacture.

UNIT I MACHINERIES USED IN PRECLOSING AND CLOSING DEPARTMENT 9

Clicking machineries – Mechanical clicking press – Hydraulic clicking press – Hytronic clicking press – Press knife - Strap Cutting Machine. Splitting machine, Skiving Machine, edge – folding, stamping, and Sewing Machine – Flat bed – Post bed – Cylinder bed Twin needle flat machine – Different Feed Mechanism. Zigzag Machine, Punching, Crimping, Eyeleting, Seam – rubbing and taping.

UNIT II MACHINERIES USED IN LASTING AND BOTTOMING DEPARTMENT 9

Counter Moulding, Insole attaching, Toe puff activator, Mulling chamber, thermo-cementing, preforming, Toe lasting, side lasting, seat lasting, Heel crowing, heat setter, Hot air blower, Roughing machine, Heat Reactivator, Sole Pressing machine, Delasting machine, Polishing machine

UNIT III ADVANCED FOOTWEAR MACHINES AND TRANSPORT SYSTEM 10

Dieless cutting, Water jet cutting, CAM for automatic stitching. Different types of material handling system – Manual, semi – automatic and automatic conveyor.

UNIT IV MODULAR MANUFACTURING AND FOOTWEAR UNIT LAYOUT 11

Productivity improvements: scheduling, simulation, Toyota and lean manufacturing system. Factor affecting plant location and construction of factory building for balancing the production line in footwear industry.

UNIT V PREVENTIVE MAINTENANCE AND SAFETY 6

Preventive maintenance and safety in the use of footwear machinery

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to understand the working principles of machineries used in footwear manufacture and their use and maintenance.

The students also understand the following

- CO1. General principles involved in various machineries used in footwear manufacture.
- CO2. Salient features and purpose of the various machinery used.
- CO3. Preventive maintenance and safety in the use of footwear machinery.
- CO4. Adjustment of machinery parts for proper functioning of different machines used in footwear processing.
- CO5. Design of optimal machinery layout in footwear unit.

REFERENCES:

1. Thornton, J.H, "Text Book of Footwear Manufacture", National Trade Press Ltd., London, 1970.
2. Blakeman, J., "An Introduction to applied Science for Boot and Shoe Manufacture", The Anglo American Technical Co.Ltd., London, 1924.

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	General principles involved in various machineries used in footwear manufacture	2	-	3	3	-	3	-	-	-	-	-	-	2	-	-	2
CO2	Salient features and purpose of the various machinery used.	2	-	3	3	-	3	-	-	-	-	-	-	2	-	-	2
CO3	Preventive maintenance and safety in the use of footwear machinery.	2	-	3	3	-	3	-	-	-	-	-	-	2	-	-	2
CO4	Adjustment of machinery parts for proper functioning of different machines used in footwear processing.	2	-	3	3	-	3	-	-	-	-	-	-	2	-	-	2
CO5	Design of optimal machinery layout in footwear unit.	2	-	3	3	-	3	-	-	-	-	-	-	2	-	-	2
Footwear Machinery		2	-	3	3	-	3	-	-	-	-	-	-	2	-	-	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

OBJECTIVE

To impart practical exposure in unit operations of full shoe manufacture

UNIT I UPPER FABRICATION 40

Assessment on cut components, practice in sewing machine – pedal control without thread – Thread –synthetic – leather, practice on pre-closing operation – skiving - splitting- folding, practice on fabrication of – derby - oxford - slip on, practical exposure on upper inspection and assessment practice

UNIT II BOTTOM STOCK PREPARATION 10

Insole cutting - Sole cutting and cutting other sections/components. Leather/Rubber Sole preparation - Heel attaching - Heel treatment - Edge Treatment - Finishing.

UNIT III LASTING AND FINISHING 40

Insole attachment - base strap lasting – vamp lasting – full strap lasting(Manual practice), hand drafting – practice on lasting machine – practice on fabrication of different styles of footwear - shoe dressing and finishing

TOTAL: 90 PERIODS**COURSE OUTCOMES:**

At the end of the course, the students will

- CO1. Have knowledge on bottom stock preparation and upper fabrication.
- CO2. Have practical knowledge on lasting and finishing process.
- CO3. Gain skill set to handle full shoe manufacture.

REFERENCES:

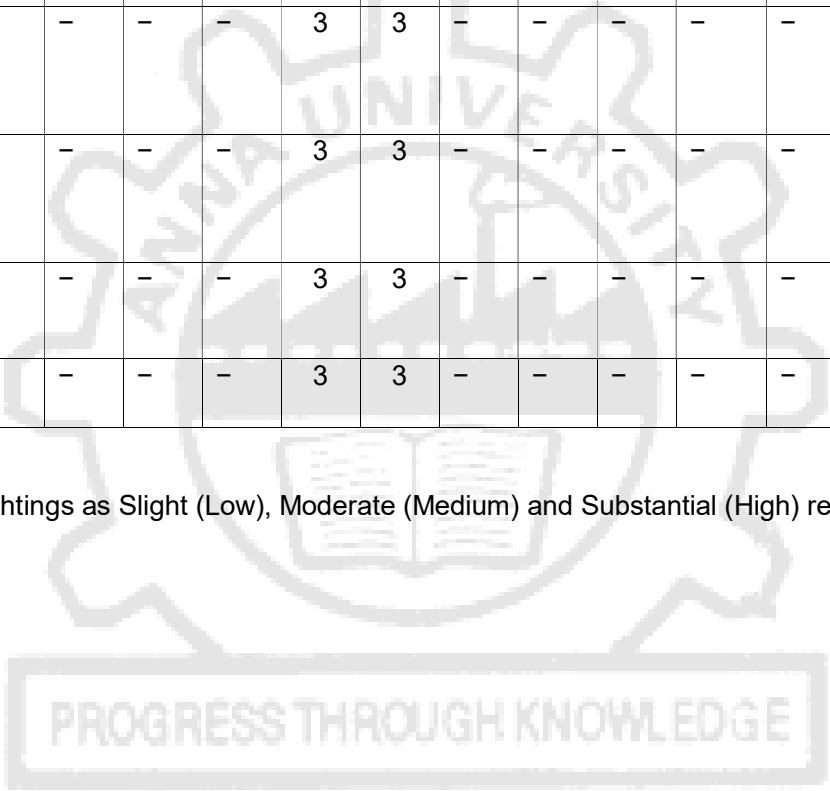
1. Bordoli, B., "The Boot and Shoe Maker", (4 volumes) The Gresham Publishing Co.Ltd., London, 4th edition, 1966.
2. Katz, R.J., "Footwear: Shoes and Socks You can make Yourself" Reinhold, New York, 1979.
3. "Manual of shoe designing", CLRI Publications, 1999.

Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Have knowledge on bottom stock preparation and upper fabrication.	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3
CO2	Have practical knowledge on lasting and finishing process.	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3
CO3	Gain skill set to handle full shoe manufacture.	-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3
Footwear Fabrication Laboratory - II		-	-	-	-	3	3	-	-	-	-	-	-	-	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

To provide students a practical knowledge on the use of computer assisted designing techniques for making footwear

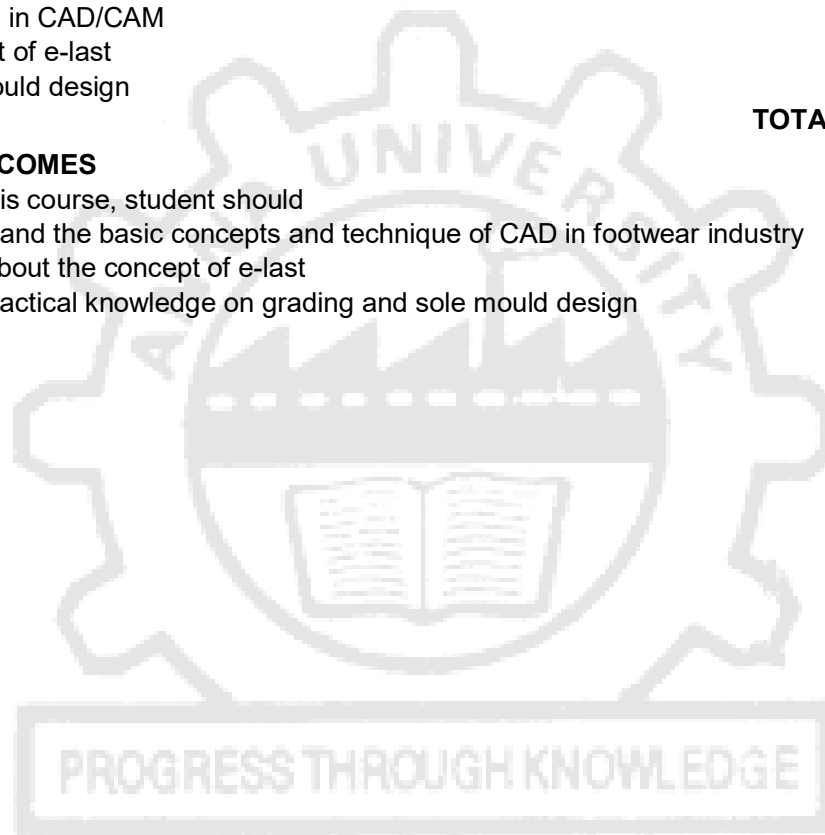
LIST OF EXPERIMENTS

- 2D and 3D digitization
- Line modifications
- Patter creation using CAD
- Pattern Engineering
- Grading in CAD/CAM
- Concept of e-last
- Sole mould design

TOTAL: 90 PERIODS**COURSE OUTCOMES**

At the end of this course, student should

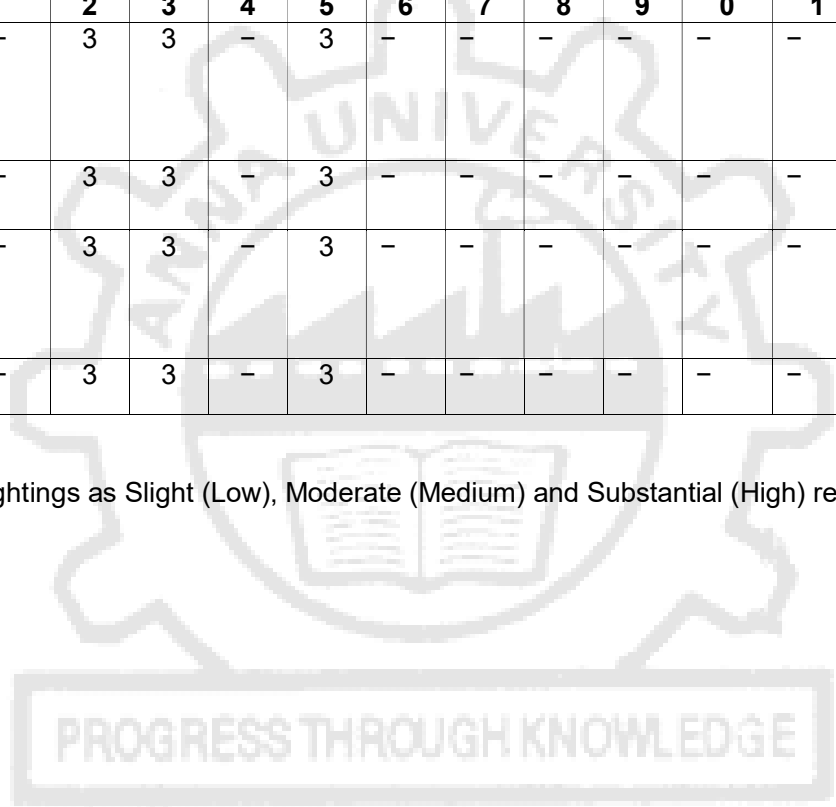
- CO1. Understand the basic concepts and technique of CAD in footwear industry
CO2. Learn about the concept of e-last
CO3. Have practical knowledge on grading and sole mould design

*Attested*

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the basic concepts and technique of CAD in footwear industry	-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO2	Learn about the concept of e-last	-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CO3	Have practical knowledge on grading and sole mould design	-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3
CAD/CAM for Footwear Designing		-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



SEMESTER III

FW5301	POLYMERS AND AUXILIARIES FOR FOOTWEAR	L	T	P	C
		3	0	0	3

OBJECTIVE

The objective of this course is provide theoretical knowledge on various chemicals and polymers associated with footwear

UNIT I PRINCIPLES FOR PREPARATION OF POLYMERIC MATERIALS 9

Definition and classification of polymers - Chemistry and mechanism involved in different polymerisation processes such as Stepwise, Addition, Ring opening, Free Radical polymerisations (Bulk, solution, suspension and emulsion polymerisations) – Copolymerisation - Anionic and Cationic polymerisations.

UNIT II MODIFICATIONS OF POLYMERIC MATERIALS FOR DIFFERENT FOOTWEAR COMPONENTS 8

i. Polymer Blending : High polymer blends - Plasticization – Other additives, fillers, Antioxidants, flame retardants, stabilizers, colorants and pigments - Post reactions of polymers ii. Moulding techniques and equipment used in fabrication of polymer products such as : Injection moulding, calendaring, Reaction Injection moulding (RIM), Blow moulding etc.

UNIT III PROPERTIES, SPECIFIC USES AND TESTING OF DIFFERENT POLYMER MATERIALS 8

Properties and test procedures for polymer materials such as rheological, mechanical, electrical, thermal, chemical and comfort - suitability of polymer materials for different components of footwear such as upper, lining, shank, insole, outer sole, heel, thread etc.

UNIT IV CHEMISTRY AND TECHNOLOGY IN MANUFACTURING POLYMERIC MATERIALS 8

Natural & synthetic rubber PVC - Polystyrene - PU, LDPE & HDPE Polypropylene - Nylon – EPDM Polyesters- Polyamines - EVA-ABS - Acrylics - Fibre Reinforced Plastics - Poromerics / PVC or PU coated fabrics.

UNIT V ADHESIVES 8

Adhesive formulations involving starch, glue, latex, rubber solutions, chloroprene, PU etc. Properties of adhesives & their choice for different purposes and in construction as in DIP, DVP, cemented etc. Mechanism of adhesion.

UNIT VI FOOTWEAR DRESSING CHEMICALS 4

Formulation of polymeric materials such as shoe polishes, upper dressings, glazing materials, lacquers, binders, resins - Properties and their application in footwear industry. Manufacture of shoe finishes.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of this course the students will be able

- CO1. To understand various chemicals materials used in footwear components
- CO2. To understand various polymers materials used in footwear components
- CO3. Aware of manufacturing and testing of various polymer materials of footwear industry

Attested

REFERENCES:

1. Miles, D.C. and Briston, J.H., "Polymer Technology", Temple Press, London, 1965.
2. Flory, P.R., "Principles of Polymer Chemistry", Cornell University Press, Ithaca, New York, 1953.
3. Kaufman, H.S. and Falcetta, J.J., "Introduction to Polymer Science and Technology", JohnWiley& Sons, New York, 1978.
4. Harvey, A.J., "Footwear Materials and Process Technology", LASRA Publications, New Zealand, 1982



Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	To understand various chemicals materials used in footwear components	3	3	-	3	-	3	-	-	-	-	-	-	3	-	-	-
CO2	To understand various polymers materials used in footwear components	3	3	-	3	-	3	-	-	-	-	-	-	3	-	-	-
CO3	Aware of manufacturing and testing of various polymer materials of footwear industry	3	3	-	3	-	3	-	-	-	-	-	-	3	-	-	-
Polymers and Auxiliaries for Footwear		3	3	-	3	-	3	-	-	-	-	-	-	3	-	-	-

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



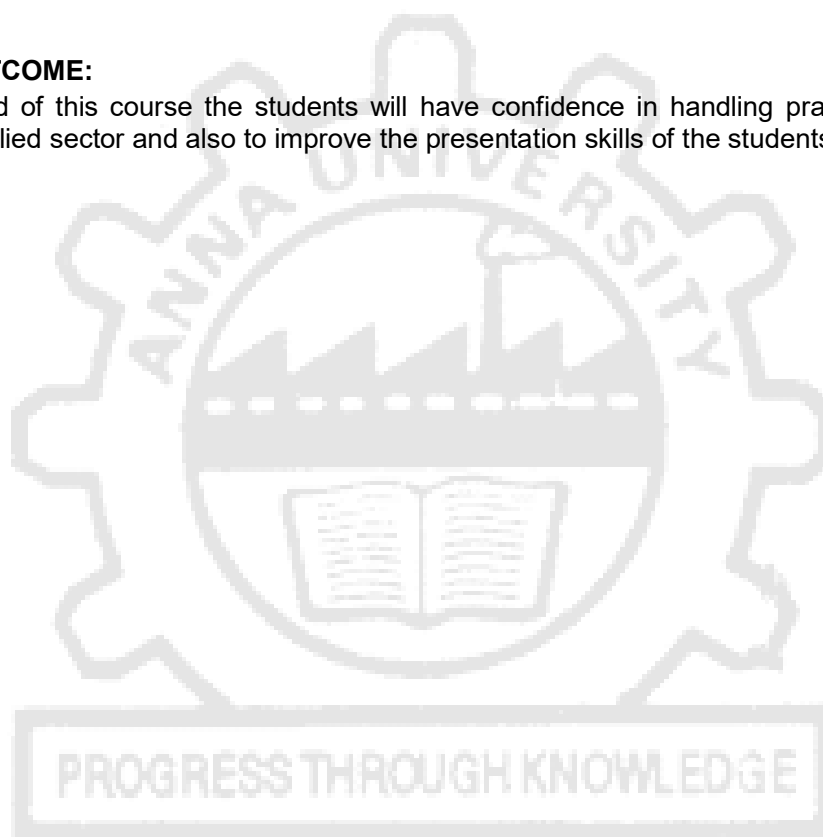
OBJECTIVE

The industrial internship is expected to enhance the technical employability skills of the students.

Students are expected to undertake industrial internship programme during the summer vacation. Minimum duration of this should be 1 month. During their internship programme, the students are expected to at least resolve one of the problems faced by the industry. Students pursuing R&D elective stream will be allowed to take up their internship at a research lab. As a part of this course students are expected to make presentations and report on the work they have carried out during their internship.

COURSE OUTCOME:

CO1. At the end of this course the students will have confidence in handling practical aspects in footwear and allied sector and also to improve the presentation skills of the students

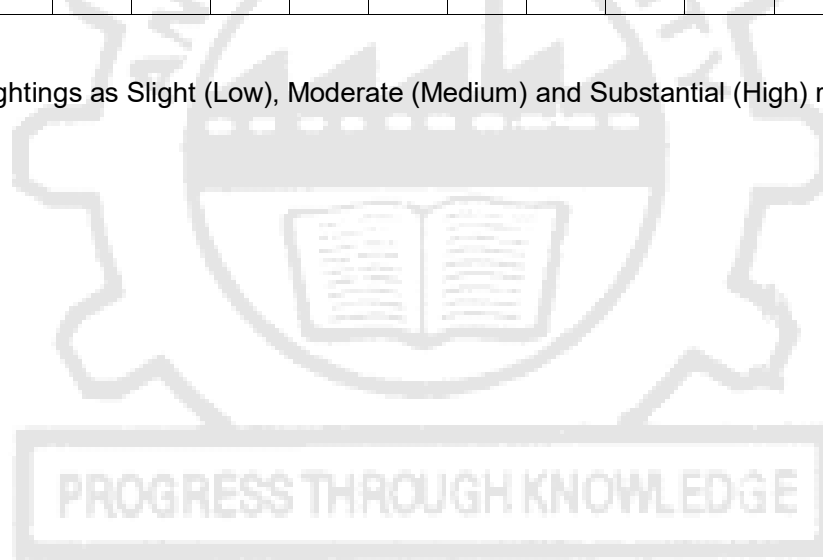


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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Have confidence in handling practical aspects in footwear and allied sector and also to improve the presentation skills of the students	-	-	-	-	-	-	-	-	-	3	-	3	3	2	2	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

The objective of this course is to facilitate the students to identify innovative projects that promotes creativity.

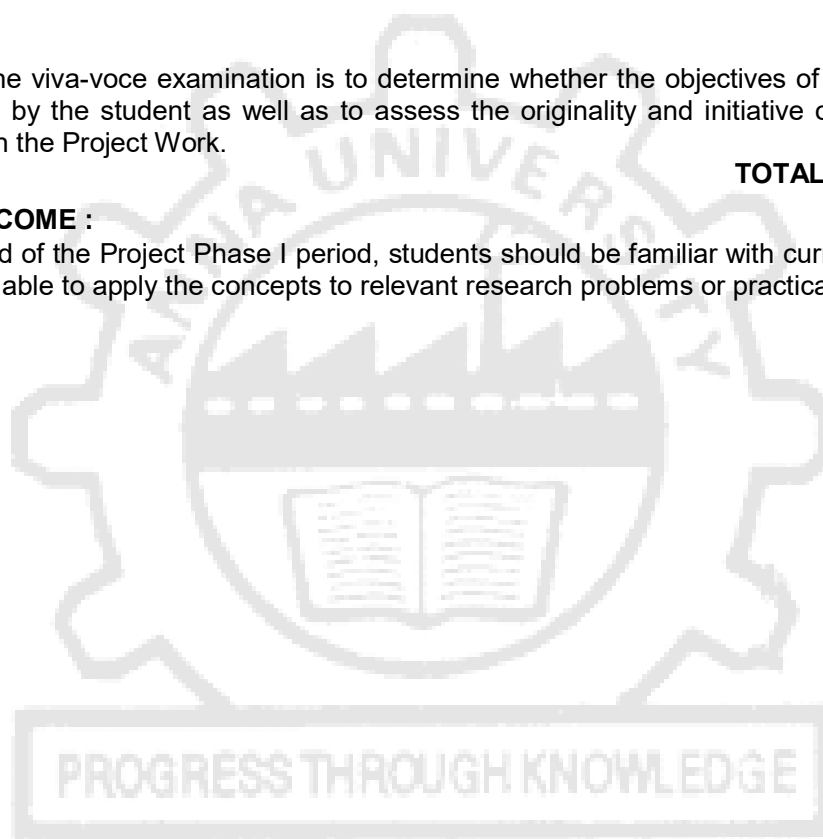
Under Project Phase I the students are expected to pursue preliminary work on a project undertaken by and assigned to him/her by the Department. A report should be submitted based on the information available in the literature or data determined in the laboratory/industry. The objective of the project work is to make use of the knowledge gained by the student at various stages of the degree programme. Project Phase I is intended to facilitate the better completion of project extended through Project Phase II in Semester IV.

VIVA VOCE

The object of the viva-voce examination is to determine whether the objectives of the Project work have been met by the student as well as to assess the originality and initiative of the student as demonstrated in the Project Work.

TOTAL: 180 PERIODS**COURSE OUTCOME :**

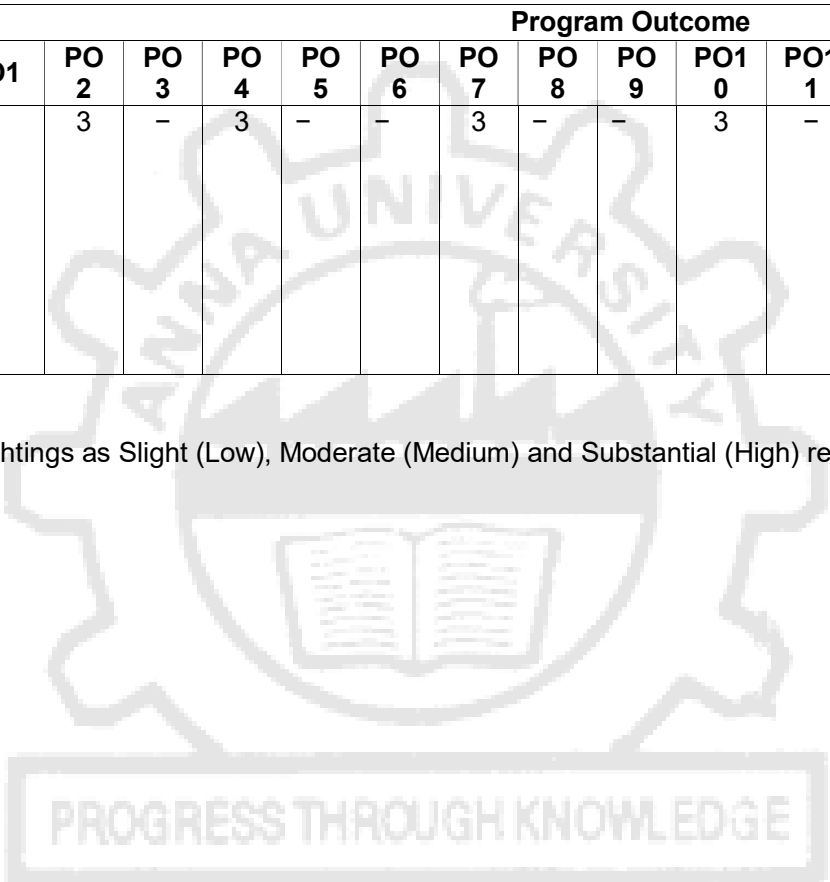
CO1.At the end of the Project Phase I period, students should be familiar with current thinking in their field, and able to apply the concepts to relevant research problems or practical applications.

*Attested*

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Familiar with current thinking in the field, and able to apply the concepts to relevant research problems or practical applications.	-	3	-	3	-	-	3	-	-	3	-	3	-	-	3	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



SEMESTER IV

FW5411

PROJECT PHASE II

L T P C

0 0 24 12

OBJECTIVE

The objective of the project is to make use of the knowledge gained by the student at various stages of the degree programme. This helps to judge the level of proficiency, originality and capacity for application of the knowledge attained by the student at the end of the programme.

The students should continue their work proposed in Project Phase I and are expected to complete the proposed work. A report should be submitted based on the data determined in the laboratory/industry. The objective of the project work is to make use of the knowledge gained by the student at various stages of the degree programme. This helps to judge the level of proficiency, originality and capacity for application of the knowledge attained by the student at the end of the programme.

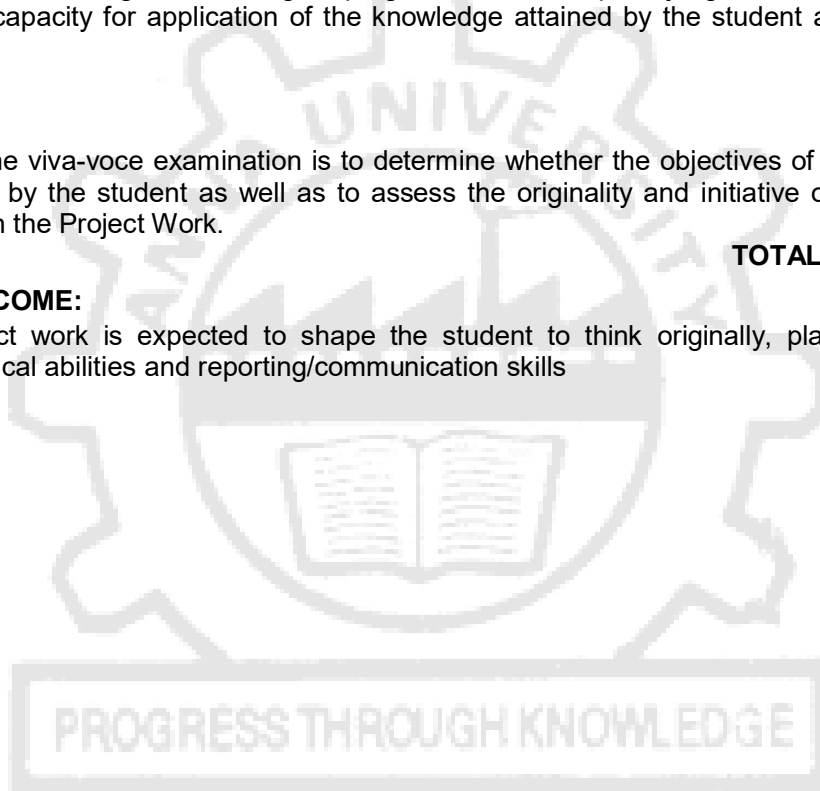
VIVA VOCE

The object of the viva-voce examination is to determine whether the objectives of the Project work have been met by the student as well as to assess the originality and initiative of the student as demonstrated in the Project Work.

TOTAL: 360 PERIODS

COURSE OUTCOME:

CO1.The project work is expected to shape the student to think originally, plan/execute work properly, analytical abilities and reporting/communication skills

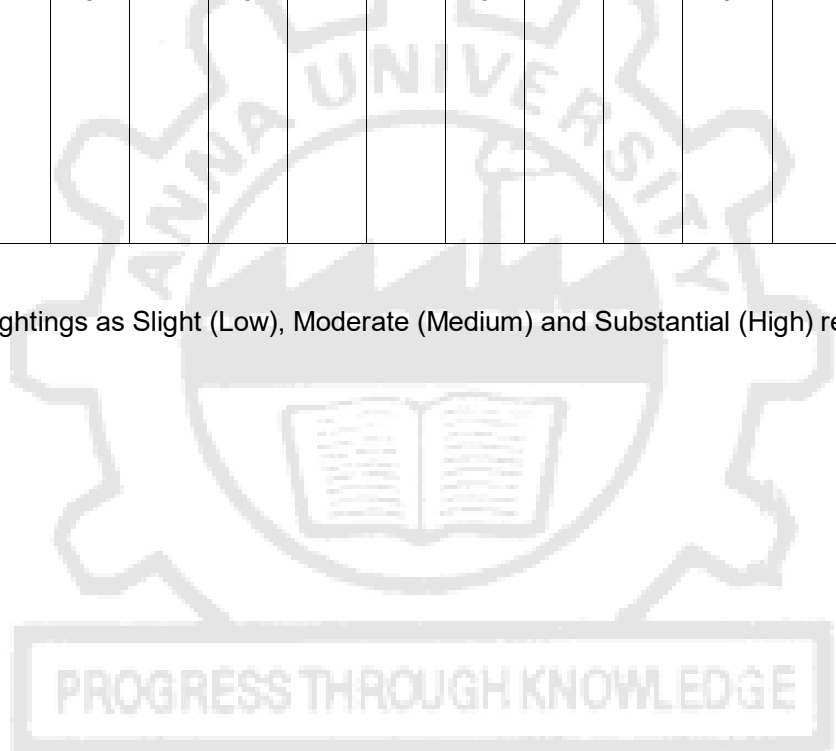


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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Expected to shape the student to think originally, plan/execute work properly, analytical abilities and reporting/communication skills	-	3	-	3	-	-	3	-	-	3	-	3	-	-	3	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



ELECTIVES

FW5001	COMPUTATIONAL METHODS AND COMPUTER GRAPHICS	L	T	P	C
		3	0	0	3

OBJECTIVE

The objective of this course is provide various theories on computation methods and graphics.

UNIT I SOLUTION OF LINEAR EQUATION AND INTERPOLATION 9

Solution of a linear system by Gaussian, Gauss-Hordon, Jacobi and Gauss- seidal methods. Interpolation with Newton divided differences – Lagrange’s polynomial – numerical differentiation with interpolation polynomials. Numerical integration by trapezoidal, Simpsons rule and two point Gaussian quadrature.

UNIT II INITIAL AND B.VP FOR ODE 9

Taylor series, Euler, Modified Euler, RungeKutta method of Fourth order for First and Second order differential equations – Finite difference solution for the second order ordinary differential equation.

UNIT III FINITE ELEMENT METHOD 9

Integral Formulation and variational methods – Mathematical concepts, weak formulation of BVP, variational methods of approximation, Two dimensional BVP – Model equation, Finite element discretization, Interpolation – function, Assembly of element equation, Axisymmetric problems- Mesh generation and interposition of Boundary condition.

UNIT IV TWO DIMENSIONAL GRAPHICS 9

Line, circle, ellipse drawing algorithm, line attributes, curve attributes, character generation, line clipping algorithm, two dimensional geometric transformations.

UNIT V THREE DIMENSIONAL GRAPHICS 9

Bezier curves, Bezier surfaces, generation of quadric surfaces, Three dimensional geometric transformations, viewing transformations– projections.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students are expected to

- CO1. Have knowledge on information technology,
- CO2. Comprehend the application aspects of finite element method
- CO3. To understand different theories on computation methods and computer graphics.

REFERENCES:

1. Grewal, B.S. and Grewal J.S.” numerical methods in Engineering & Sciences”, Khann Publications, New Delhi 2015.
2. Reddy, J.N.”An Introduction to Finite Element Methods”, Third Edition, McGraw Hill Inc.New York, 2017.
3. Hearn and Bakes, “Computer Graphics” (2nd Edition), Prentice Hall, 1994.

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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Have knowledge on information technology	-	2	3	2	3	-	-	-	-	-	-	-	2	-	-	2
CO2	Comprehend the application aspects of finite element method	-	2	3	2	3	-	-	-	-	-	-	-	2	-	-	2
CO3	To understand different theories on computation methods and computer graphics.	-	2	3	2	3	-	-	-	-	-	-	-	2	-	-	2
Computational Methods and Computer Graphics		-	2	3	2	3	-	-	-	-	-	-	-	2	-	-	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVES

- To equip individuals with knowledge and skills undertaking Corporate Social Responsibility.
- To develop competencies for effective field interventions, research and management of CSR interventions.
- To develop an insight into present CSR strategies of model business organization.
- To enable students with conceptual clarity on need, purpose and relevance of research applicability in CSR practice.

UNIT I INTRODUCTION**9**

Introduction to CSR - Meaning & Definition of CSR, History & evolution of CSR. Concept of Charity, Corporate philanthropy, Corporate Citizenship, CSR-an overlapping concept. Concept of sustainability & Stakeholder Management.

CSR through triple bottom line and Sustainable Business; relation between CSR and Corporate governance; environmental aspect of CSR; Chronological evolution of CSR in India; models of CSR in India, Carroll's model; drivers of CSR; major codes on CSR; Initiatives in India.

UNIT II PRINCIPLES OF CSR**9**

International framework for corporate social Responsibility, Millennium Development goals, Sustainable development goals, Relationship between CSR and MDGs. United Nations (UN) Global Compact 2011. UN guiding principles on business and human rights. OECD CSR policy tool, ILO tri-partite declaration of principles on multinational enterprises and social policy.

UNIT III LEGISLATION AND ACTS**6**

CSR-Legislation in India & the world. Section 135 of Companies Act 2013. Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and Computation of Net Profit's Implementing Process in India.

UNIT IV REGULATORY REFORMS**7**

The Drivers of CSR in India, Market based pressure and incentives civil society pressure, the regulatory environment in India Counter trends. Performance in major business and programs. Voluntarism Judicial activism.

UNIT V GUIDELINES OF CSR**8**

Identifying key stakeholders of CSR & their roles. Role of Public Sector in Corporate, government programs that encourage voluntary responsible action of corporations. Role of Nonprofit & Local Self-Governance in implementing CSR; Contemporary issues in CSR & MDGs. Global Compact Self-Assessment Tool, National Voluntary Guidelines by Govt. of India. Understanding roles and responsibilities of corporate foundations.

UNIT VI CSR REVIEW AND INITIATIVES**6**

Review current trends and opportunities in CSR. CSR as a Strategic Business tool for Sustainable development. Review of successful corporate initiatives & challenges of CSR. Case Studies of Major CSR Initiatives.

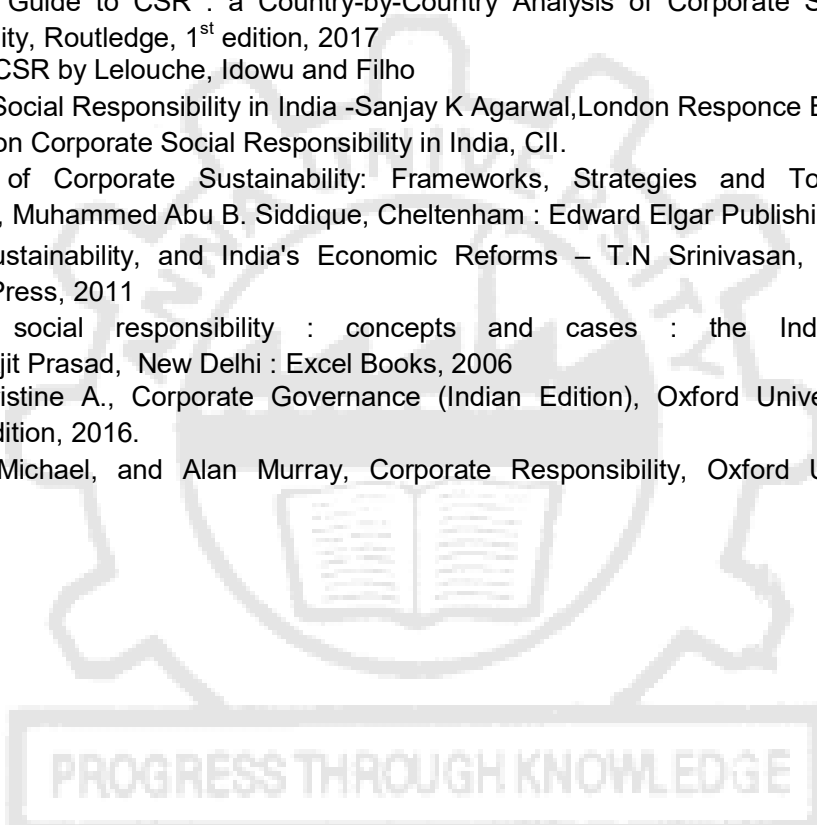
COURSE OUTCOMES:

At the end of the course, the students would have

- CO1. Gained comprehensive knowledge to relate the multidisciplinary, strategic, and evolving nature of corporate social responsibility.
- CO2. Able to apply ethical decision making principles in a professional or business context.
- CO3. Aware of regulatory reforms, guidelines and initiatives of CSR.

REFERENCES:

1. Corporate Social Responsibility: An Ethical Approach - Mark S. Schwartz, Peterborough, Ont : Broadview, 2011.
2. The World Guide to CSR : a Country-by-Country Analysis of Corporate Sustainability and Responsibility, Routledge, 1st edition, 2017
3. Innovative CSR by Lelouche, Idowu and Filho
4. Corporate Social Responsibility in India -Sanjay K Agarwal, London Responce Books 2008
5. Handbook on Corporate Social Responsibility in India, CII.
6. Handbook of Corporate Sustainability: Frameworks, Strategies and Tools -M. A.Quaddus, Muhammed Abu B. Siddique, Cheltenham : Edward Elgar Publishing, 2011
7. Growth, Sustainability, and India's Economic Reforms – T.N Srinivasan, Oxford : Oxford University Press, 2011
8. Corporate social responsibility : concepts and cases : the Indian experience, C V Baxi; Ajit Prasad, New Delhi : Excel Books, 2006
9. Mallin, Christine A., Corporate Governance (Indian Edition), Oxford University Press, New Delhi, 5th edition, 2016.
10. Blowfield, Michael, and Alan Murray, Corporate Responsibility, Oxford University Press, 2014



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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Gained comprehensive knowledge on the relate and describe the multidisciplinary, strategic, and evolving nature of corporate social responsibility	-	-	-	-	-	-	-	2	3	2	-	-	-	-	3	-
CO2	Able to apply ethical decision making principles in a professional or business context	-	-	-	-	-	-	-	2	3	2	-	-	-	-	3	-
CO3	Aware of regulatory reforms, guidelines and initiatives of CSR	-	-	-	-	-	-	-	2	3	2	-	-	-	-	3	-
Corporate Social Responsibility		-	-	-	-	-	-	-	2	3	2	-	-	-	-	3	-



1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

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[Signature]
DIRECTOR
Centre for Academic Courses
Anna University, Chennai-600 025

LE5074	ENGINEERING ECONOMICS IN PRODUCTION	L T P C
	“Syllabus is in Common with M.Tech. (Leather Technology) Programme”	3 0 0 3

OBJECTIVE

The objective of this course is to present students on project feasibility analysis, management, organization and budgeting that will enable the students to perform as efficient managers.

UNIT I PROJECT IDENTIFICATION AND PREPARATION 10

General considerations - choice of project between alternative propositions - engineering aspects- cost estimates and demand forecasting for footwear industry.

UNIT II PRINCIPLES OF PROJECT APPRAISAL 10

Investment appraisal and financial analysis through the measurement of project return –by discounted cash flow method - net present value of a project - internal rate of return - project payback period - cash flows accounting profit - intangible returns - Inflation and project appraisal.

UNIT III IMPLEMENTATION AND MANAGEMENT 9

Methodological and organisational aspects of implementation - PERT and other methods - risk and uncertainty - probability theory.

UNIT IV SOURCES OF FINANCE AND BUDGETING 9

Different sources of finance - ownership finance - ordinary share, short, medium and long term loan - budget preparation - annual cost, variable costs - allocation of costs.

UNIT V METHODS OF BUDGETING 7

Marketability method - benefit method - use of facilities method - special cost method, alternative single purpose expenditure method.

TOTA : 45 PERIODS

COURSE OUTCOMES:

At the end of this course, the students are expected to

- CO1. Understand the financial management and economics in the footwear industry
- CO2. Understand the profit value analysis
- CO3. Have knowledge in organisational aspects of implementation

REFERENCES:

1. An Introduction to Engineering Economics", The institutions of civil engineer, 1972.
2. DasGupta A.K. and Pearle D.W. Cost - Benefit analysis Theory and Practice, MacMillan, 1972.
3. Little M.D. and Mirrlees J.A., Project Appraisal and Planning for Developing countries, H.E.B, London.
4. Price Gittinger J., "Economic Analysis of agricultural projects", The World Bank, 1984.

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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the financial management and economics in the footwear industry	-	-	-	2	2	-	-	-	-	-	3	2	-	-	2	-
CO2	Understand the profit value analysis	-	-	-	2	2	-	-	-	-	-	3	2	-	-	2	-
CO3	Have knowledge in organizational aspects of implementation	-	-	-	2	2	-	-	-	-	-	3	2	-	-	2	-
Engineering Economics In Production		-	-	-	2	2	-	-	-	-	-	3	2	-	-	2	-

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

The objective of this course is to present the students on the footwear performance and customer services

UNIT I FOOTWEAR PERFORMANCE 9

Definition of Footwear Performance; Customer Expectations; Comparative measurement of Performance for Footwear.

UNIT II CUSTOMER COMPLAINTS 9

Customer Complaints and its classification; Justified and unjustified complaints; Customer attitude and international obligations.

UNIT III CUSTOMER SERVICES 9

Product Liability; Different types of customer services; Settlement of complaints; Declaration of Services; Guarantee & Warranty.

UNIT IV IMPORTANCE OF TESTING 9

Significance of Testing for assessment of Footwear Performance; List of testing and their methodology.

UNIT V AVOIDANCE OF COMPLAINTS 9

Fashion Vs. Suitability; Taking care of Footwear; Shoe care products; Defects check list & maintaining quality in production.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, one can

- CO1. Enhance external and internal customer relationships by delivering a consistent superior customer experience
- CO2. To efficiently & successfully resolve queries ,
- CO3. To supply relevant information & conclude every interaction on a positive note.

REFERENCES:

1. Thornton, J.H., "Text book of footwear Manufacture", National Trade Press Book Ltd., London, 1970.
2. David G. Owen., John E. Montgomery., Mary J. Davis., " Product liability and safety", cases and material, Fifth Edition. 2007.

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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Enhance external and internal customer relationships by delivering a consistent superior customer experience	-	2	2	2	3	2	-	-	-	-	-	-	-	-	2	3
CO2	To efficiently & successfully resolve queries	-	2	2	2	3	2	-	-	-	-	-	-	-	-	2	3
CO3	To supply relevant information & conclude every interaction on a positive note.	-	2	2	2	3	2	-	-	-	-	-	-	-	-	2	3
Footwear performance and customer services		-	2	2	2	3	2	-	-	-	-	-	-	-	-	2	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

The objective of this course is provide knowledge and demonstration on GAIT analysis

UNIT I UPPER AND LOWER LIMB ANATOMY 9

Basic anatomical terms; Neuromuscular anatomy; Bones of Trunk and Hands; Bones of pelvis and legs; Joints, Ligaments, Muscles, Tendons and Fascia.

UNIT II BIOMECHANICS CONCEPT 9

Motion - Types, Location, Direction, Magnitude. Definition of Forces, Force of Gravity, Reaction Force, Moment Arm of Force.

UNIT III GAIT 9

General features of Gait cycle – Phases of Gait – Gait initiations – Kinetics and Kinematics of Gait – Energy requirements – Pathological Gait

UNIT IV INFLUENCE OF FOOTWEAR ON GAIT 9

Influence of footwear on hip, knee, ankle and foot movement; Abnormal walking base; Common pathologies affecting gait and corrective measures using footwear.

UNIT V GAIT ANALYSIS TECHNIQUE 9

Visual/observational gait analysis; 2D video analysis; 3D video analysis; Inertial sensors; Electrogoniometers; Force platforms; Wearable sensors; Pressure platforms; Electromyography; Energy consumption.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of this course the students will be able

- CO1. To understand principle and techniques of GAIT analysis.
- CO2. Have knowledge on influence of footwear on human being.
- CO3. To appreciate the use of GAIT in footwear design.

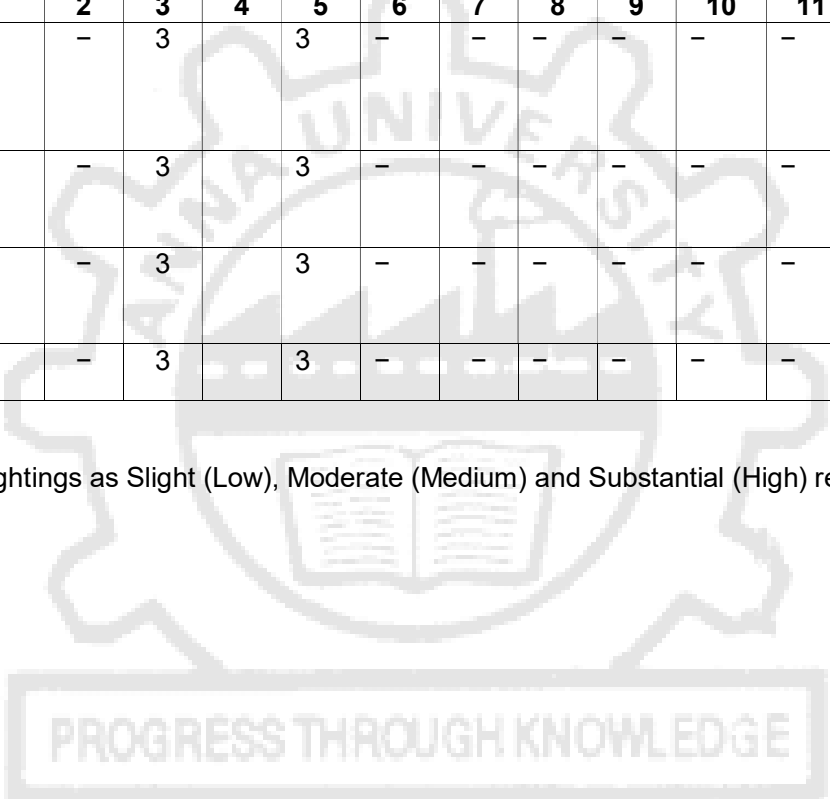
REFERENCES:

1. Gait Analysis – An Introduction; Editor(s): Levine & Richards & Whittle, Release Date: 10 Jul 2012, Churchill Livingstone Print Book, ISBN:9780702042652, eBook ISBN:9780702051999, Pages: 192, Dimensions: 246 X 189
2. Basic biomechanics. Susan. J.Hall. Sixth edition 2011, McGraw-Hill Humanities/Social Sciences/Languages; ISBN-10: 0073376442 ISBN-13: 978-0073376448
3. Fundamentals of Biomechanics, Duane knudson. Springer; Second edition (2007)ISBN10: 0387493115ISBN-13: 978-0387493114
4. Kinesiology – The mechanics and patho mechanics of human movement. Carol A. Oatis. Edition 2, Lippincott Williams & Wilkins, 2009 ISBN 0781774225, 9780781774222
5. Gait Analysis – Normal and pathological function. Jacquelinperpy& Judith M.Burnfield. SLACK Incorporated; 2nd Revised edition (15 March 2010) ISBN-10: 1556427662, ISBN-13: 9781556427664,
6. Clinical Gait analysis – Theory and Practice. Chris Kirtley, Churchill Livingstone; 1 edition 2005; ISBN-10: 0443100098, ISBN-13: 978-0443100093.
7. Chaurasia, B.D., " Human Anatomy: Regional and Human Osteology", CBS, New Delhi. 2004

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	To understand principle and techniques of GAIT analysis	2	-	3		3	-	-	-	-	-	-	-	2	-	-	3
CO2	Have knowledge on influence of footwear on human being	2	-	3		3	-	-	-	-	-	-	-	2	-	-	3
CO3	To appreciate the use of GAIT in footwear design.	2	-	3		3	-	-	-	-	-	-	-	2	-	-	3
Gait Analysis		2	-	3		3	-	-	-	-	-	-	-	2	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVES

- Studying the work procedure and understanding the relationships between the workers and working environments.
- To study the applications of ergonomic principles and physiology of workers.
- To know the concepts of personal protective equipment and its usages.
- To create the knowledge in process and equipment design in safety aspects.

UNIT I ERGONOMICS AND ANATOMY**9**

Introduction to ergonomics: The focus of ergonomics, ergonomics and its areas of application in the work system, a brief history of ergonomics, attempts to humanize work, modern ergonomics, future directions for ergonomics

Anatomy, Posture and Body Mechanics: Some basic body mechanics, anatomy of the spine and pelvis related to posture, posture stability and posture adaptation, low back pain, risk factors for musculoskeletal disorders in the workplace, behavioural aspects of posture, effectiveness and cost effectiveness, research directions

UNIT II HUMAN BEHAVIOR**9**

Individual differences, Factors contributing to personality, Fitting the man to the job, Influence of difference on safety, Method of measuring characteristics, Accident Proneness. Motivation, Complexity of Motivation, Job satisfaction. Management theories of motivation, Job enrichment theory. Frustration and Conflicts, Reaction to frustration, Emotion and Frustration. Attitudes Determination of attitudes, Changing attitudes Learning, Principles of Learning, Forgetting, Motivational requirements.

UNIT III ANTHROPOMETRY AND WORK DESIGN FOR STANDING AND SEATED WORKS**9**

Designing for a population of users, percentile, sources of human variability, anthropometry and its uses in ergonomics, principals of applied anthropometry in ergonomics, application of anthropometry in design, design for everyone, anthropometry and personal space, effectiveness and cost effectiveness

Fundamental aspects of standing and sitting, an ergonomics approach to work station design, design for standing workers, design for seated workers, work surface design, visual display units, guidelines for design of static work, effectiveness and cost effectiveness, research directions

UNIT IV MAN - MACHINE SYSTEM AND REPETITIVE WORKS AND MANUAL HANDLING TASK**9**

Applications of human factors engineering, man as a sensor, man as information processor, man as controller – Man vs Machine.

Ergonomics interventions in Repetitive works, handle design, key board design- measures for preventing in work related musculoskeletal disorders (WMSDs), reduction and controlling, training Anatomy and biomechanics of manual handling, prevention of manual handling injuries in the work place, design of manual handling tasks, carrying, postural stability

UNIT V HUMAN SKILL AND PERFORMANCE AND DISPLAY, CONTROLS AND VIRTUAL ENVIRONMENTS**9**

A general information-processing model of the users, cognitive system, problem solving, effectiveness.

Principles for the design of visual displays- auditory displays- design of controls- combining displays and controls- virtual (synthetic) environments, research issues.

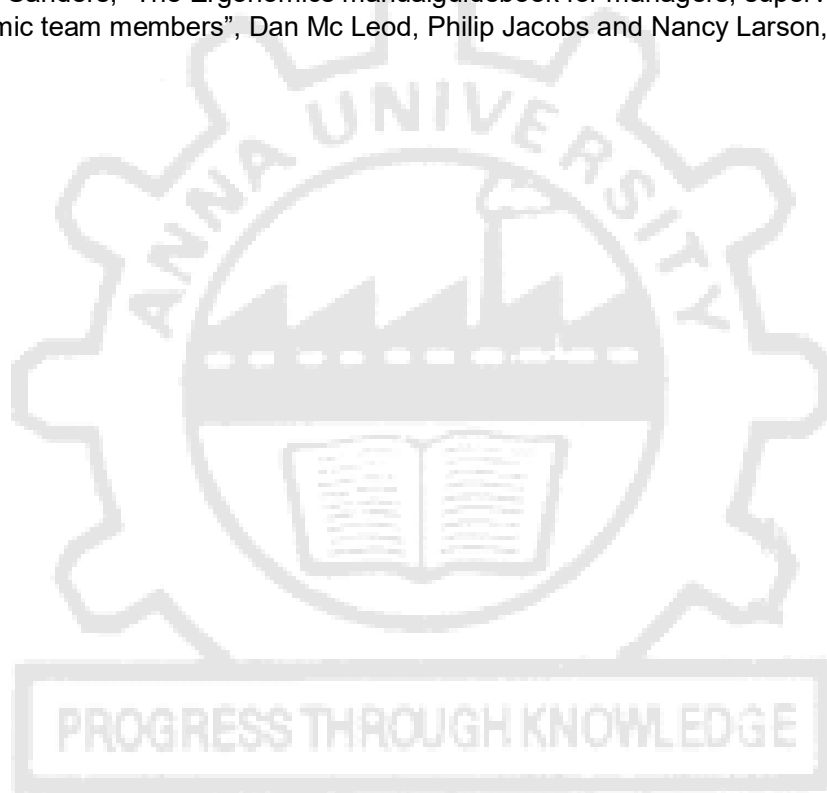
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COURSE OUTCOMES:

- CO1. Students can have the knowledge in work procedure and applications in hazardous workplaces.
- CO2. Students can design their own safety devices and equipment to reduce the accidents possibilities.
- CO3. Students will be able to incorporate human factors in design of Personal protective equipment.
- CO4. They know the risk factors, guide lines for safe design of man machine systems considering human factors.

REFERENCES:

- 1. R.S. Bridger, Taylor and Francis, "Introduction to Ergonomics" 2nd Edition, 2003
- 2. Michael O'Neill, "Ergonomic design for organizational effectiveness", 1998
- 3. Mark S. Sanders, "The Ergonomics manualguidebook for managers, supervisors, and ergonomic team members", Dan McLeod, Philip Jacobs and Nancy Larson, 1990



Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Students can have the knowledge in work procedure and applications in hazardous workplaces	-	-	-	-	-	3	3	2	3	-	-	-	-	3	2	-
CO2	Students can design their own safety devices and equipment to reduce the accidents possibilities	-	-	-	-	-	3	3	2	3	-	-	-	-	3	2	-
CO3	Students will be able to incorporate human factors in design of Personal protective equipment	-	-	-	-	-	3	3	2	3	-	-	-	-	3	2	-
CO4	They know the risk factors, guide lines for safe design of man machine systems considering human factors	-	-	-	-	-	3	3	2	3	-	-	-	-	3	2	-
Human Factors in Engineering		-	-	-	-	-	3	3	2	3	-	-	-	-	3	2	-

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

LE5072	INDUSTRIAL SAFETY AND OCCUPATIONAL HEALTH	L T P C
	“Syllabus is in Common with M.Tech (Leather Technology) Programme”	3 0 0 3

OBJECTIVE

This course will make the students to understand the regulations and practices associated with safety and occupational health.

UNIT I SAFETY PHILOSOPHY 9

Place of industry in society Industrial management role – supervisor’s role - role of workers – role of trade unions - role of govt. and various other agencies - Factory Act 1948 and the rules. Hazardous Industry - need for safety, legal humanitarian, economic safety and productivity. Factors impeding safety.

UNIT II ACCIDENT PREVENTION AND SAFETY TRAINING 9

Definition of accident, injury, dangerous occurrence, unsafe act, unsafe condition. Theories of accident occurrence - principles of accident - prevention - accident inventive methods – industrial accident inventive methods - industrial accidents - frequencies of industrial accidents in India and foreign countries - classification of accidents - industry wise and causation wise.

PREVENTION - ACCIDENT INVESTIGATION

Methods - developing safety training programme - training of supervisors - training of workers- Inplant & External courses - training of new workers - role of supervision - need for re-training.

UNIT III SAFE GUARDING OF MACHINERY AND MATERIAL HANDLING 9

Principle of machine guarding. Ergonomics of machine guarding. Type of guards - guarding of different types of machinery. Material & construction of guards. Maintenance & repair of guards, lifts & lifting tables, chairs, rope slings, rings, hooks, shackle, eyebolts power tracks and tractors, safety features.

UNIT IV FIRE HAZARDS AND CONTROL 9

Chemistry of fire, classification of fire, portable fire extinguishers and their operation – Industrial fire. Types of all fire protection equipment. Hazard Identification: Fire, explosions, indices consequence analysis, HAZOP, likelihood analysis, risk concepts and criteria, risk management Toxicity.

UNIT V OCCUPATIONAL HEALTH 9

Physical hazard, noise vibration, x-rays - ultra violet radiation - permissible exposure limits -effects of exposure - preventive & control measures. Chemical Hazards: toxic chemicals, dirt gases, fumes, mists, vapours. Noise pollution, exposures evaluation, common occupational diseases, etc.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be in the position to understand the

- CO1. Legal framework of safety and health in India and international conventions.
- CO2. Hazard identification and assessment.
- CO3. Productive machine safety in the footwear industry.
- CO4. Emergency prevention and preparedness safety and health management.

Attested

REFERENCES:

1. William Handley, Industrial Safety - Hand Book, 2nd Edition, McGraw Hill Book Company, 1969.
2. H.W.Heinrich, P.E. Dan Peterson and Nester, Road Industrial Accident Prevention, McGraw Hill Book Co., 1980.
3. R.P.Blake, Industrial Safety, II Edn., Prentice Hall Inc., New Jersey, 1963.
4. Frank P. Lees, Loss Prevention in the process industries, Butterworth Heinemann, 2004, Vol. 1 to 3.
5. V.C. Marshall, Major Chemical hazards, John Wiley & Sons, New York, 1987.
6. Guidelines for Chemical Process Quantitative Risk Analysis prepared for centre for Chemical Process Safety of the American Institute of Chemical Engineering, 1999.



Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Legal framework of safety and health in India and international conventions	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO2	Hazard identification and assessment	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO3	Productive machine safety in the footwear industry	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO4	Emergency prevention and preparedness safety and health management	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
Industrial Safety and Occupational Health		-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



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Centre for Academic Courses
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OBJECTIVE

- To facilitate understanding of the conceptual framework of marketing and its applications in decision making under various environmental constraints.

UNIT I UNDERSTANDING MARKETING AND CONSUMERS 9

Definition, Importance, Scope, Various Marketing Concepts, Marketing Mix, Marketing vs Selling, Effect of Liberalization and Globalization, Creating Customer Value. Analyzing Marketing Environment- Micro, Macro Corporate Strategic Planning: defining role marketing strategies, Marketing planning process. Marketing Information System: Concept and Components.

Understanding Consumer Behaviour, Factors Influencing Consumer Buying Behaviour, Business Buying Process, Understanding Business Buyer Behaviour

UNIT II CREATING AND MANAGING PRODUCT 9

Market Segmentation & Targeting. Differentiation & Positioning, Competitors Analysis. Product Decisions: Product Mix, Packaging and Labelling Decisions, Branding & Brand Equity, Services Marketing, New Product Development, Consumer Adoption Process, Product Life Cycle and Strategies.

UNIT III PRICING DECISIONS 9

Objectives, Factors Affecting Pricing Decisions, Pricing Methods, Price Changes, Pricing Strategies.

UNIT IV DELIVERING AND PROMOTING PRODUCT 9

Supply Chain Decisions: Nature, Types, Channel Design and Channel Management Decisions, Retailing, Wholesaling, Managing Logistics and Supply Chain.

Promotion Decisions: Communication Process, Promotion Mix, Advertising, Sales Promotion, Public Relations, Direct Selling and Online Marketing. Personal Selling: Personal Selling Process, Managing the Sales Force, Designing Quota & Territories, Evaluating Performance.

UNIT V EMERGING TRENDS IN MARKETING 9

Green Marketing, Event Marketing, Network Marketing, Direct Marketing, Social Marketing, Buzz Marketing/ Viral Marketing, Consumerism, Customer Relationship Management (CRM), Customer Satisfaction, Loyalty, Retention, Global Marketing, Rural Marketing, E-Commerce: Marketing in the Digital Age

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

On successful completion of the course students will be able to:

- CO1. Examine and discuss the key concepts and principles of marketing
- CO2. Identify and explain the main factors involved in understanding the marketplace
- CO3. Demonstrate an integrative understanding of the steps involved in marketing planning
- CO4. Analyse the components of the marketing mix

REFERENCES:

- Kotlar, Philip, Marketing Management, Prentice Hall, New Delhi, 2006
- Stanton, Etzel, Walker, Fundamentals of Marketing, Tata-McGraw Hill, New Delhi, 1994
- Saxena, Rajan, Marketing Management, Tata-McGraw Hill, New Delhi, 2010
- McCarthy, E.J., Basic Marketing: A managerial approach, Irwin, New York, 1995

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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Examine and discuss the key concepts and principles of marketing	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO2	Identify and explain the main factors involved in understanding the marketplace	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO3	Demonstrate an integrative understanding of the steps involved in marketing planning	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO4	Analyse the components of the marketing mix	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
Marketing Management		-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

OBJECTIVES

This course is to highlight the students on the properties and behavior of various materials

UNIT I FUNDAMENTALS OF MATERIAL SCIENCE 10

Atomic structure and interatomic bonding; classification of materials; structures of metals, ceramics and polymers; types and application of materials; materials selection and design consideration; Environmental issues in materials science.

UNIT II ADVANCED MATERIALS 10

Smart materials, ferroelectric, piezoelectric, optoelectric, semiconducting behavior, lasers and optical fibers, photoconductivity and superconductivity, nano materials, super alloys, shape memory alloys.

UNIT III MECHANICAL AND THERMAL PROPERTIES 10

Stress-strain diagrams of metallic, ceramic and polymeric materials, modulus of elasticity, yield strength, tensile strength, toughness, elongation, plastic deformation, viscoelasticity, hardness, impact strength, creep, fatigue, ductile and brittle fracture.

Heat capacity, thermal conductivity, thermal expansion of different materials.

UNIT IV CHARACTERISATION OF MATERIALS 8

Outline of spectroscopy methods, x-ray diffraction, electron microscopy, optical microscopy and applications to material characterization and Identification of polymeric materials, glass transition in polymers, methods of measuring it.

UNIT V SYNTHETIC FOOTWEAR MATERIALS 7

Types of synthetic materials for footwear, Characterization – Manufacturing process. Selection criteria of synthetic material for footwear.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of this course, the students will

- CO1. Understand the properties of various materials.
- CO2. Have knowledge about the methods to characterize them.
- CO3. Aware about the selection criteria of synthetic material for footwear industry.

REFERENCES:

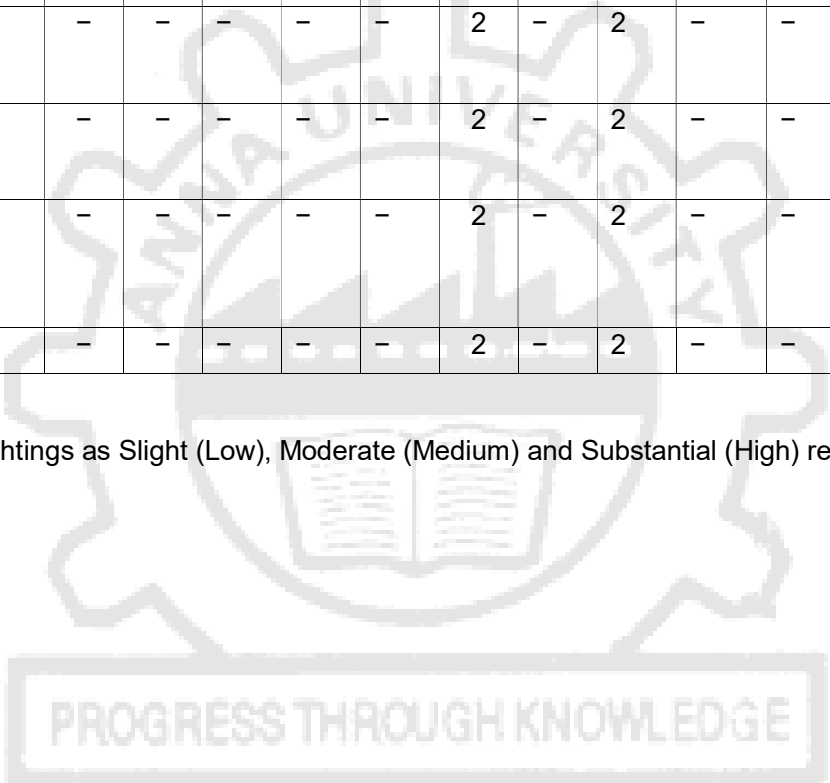
1. Callister, W.D., Fundamentals of Materials Science and Engineering, Wiley, 2007.
2. Ahuja, S. and Jespersen, N., "Modern Instrumental Analysis", Elsevier, 2006.
3. Kaufmann, E.N. Characterization of Materials, 2 Volume, Wiley 2003

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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the properties of various materials.	3	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-
CO2	Have knowledge about the methods to characterize them	3	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-
CO3	Aware about the selection criteria of synthetic material for footwear industry	3	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-
Materials Science		3	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

The objective of this course is present the students on the footwear fashion trends and their consideration in product development.

UNIT I HISTORICAL EVALUATION AND INTERNATIONAL TRENDS 6

Historical evaluation of footwear styling. Seasonal influences on fashion, cultural and geographical instances on footwear fashion. Market research and track record.

UNIT II ELEMENTS OF DESIGN AND FASHION CONSIDERATIONS 9

Elements and theories of design, Application of the basic elements of design, Ergonomics and interactive scenario of the design elements, Design Criteria through effect of shape, colour, pattern, texture and decorative materials. Life cycle of fashion

UNIT III DESIGN METHODOLOGY AND PRODUCT DEVELOPMENT 12

Brain storming method of idea generation, Understanding the consumer need and demand, Concept of space and patterns in nature, Product usage and its categories, Product mix and innovation, Design process for accessories, Types, categories and usage of footwear and leather goods. Market Strategy - Prototype Development - Field test and evaluation - Standard preparation - Second prototype - Final run. Costing

UNIT IV PRESENTATION TECHNIQUES 8

Organisation of shows and preparation of art portfolios; advertising; effect of foreign languages in the presentation and promotional activities.

UNIT V FASHION TREND AND FORECAST ANALYSIS 10

Definition and entomology of fashion, trend, style and elements of trend direction, Types of trend direction review process, Development of forecast and understanding of styling, Direction of fashion trends in footwear production and marketing.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

This course will help the students

- CO1. Have knowledge on market strategy for developing a new product.
- CO2. To understand the factors contributing to the fashion trends in footwear industry.
- CO3. Have learned about the preparation of art portfolios and presentation techniques.

REFERENCES:

1. Cott, N.F., "American Shoe Making", Shoe Trades Publishing Co., Cambridge. 1993.
2. "Apparel International" Published by P.F collier and sons, U.K, 1961.
3. "Shoes and Leather News",Published by bureau of foreign and domestic commerce, Dept of commerce, US, 1940.

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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Have knowledge on market strategy for developing a new product	-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3
CO2	To understand the factors contributing to the fashion trends in footwear industry	-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3
CO3	Have learned about the preparation of art portfolios and presentation techniques	-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3
Modern Footwear Styling		-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

The objective of this course is present students on various aspects on the organization management in footwear manufacture

UNIT I PRODUCTION MANAGEMENT 12

Overview of production management and organization in a factory. The functions of a production manager in production planning and control. Production cost, Introduction to work study. Method study and work measurement, materials handling, Manpower planning lay outing equipment selection. Specified layout for footwear industries - case study

UNIT II MARKETING STRATEGY 10

- i. Consumer psychology - factors affecting supply and demand - Market channels in the domestic market - Export Import policy.
- ii. Product Development : Style creation - Prototype preparation - Market feed back - pilot production - specification - Final prototype.

UNIT III PERSONNEL MANAGEMENT 10

Principles - Motivation, Employee training and development - Job analysis, Recruitments. Performance Evaluation Technique, wages and salary, labour laws and factory acts in footwear industry.

UNIT IV ERGONOMICS AND COMMUNICATION 7

- i. Basic man/machine relationship - Machine organisation in industrial environment.
- ii. Recording, Storage& retrieval of information - instruction - reporting information feed back process - telephone and other communication means - memoranda.

UNIT V FOOTWEAR TRADE AND INDUSTRY IN INDIA 6

Structure and concentration of the industry, production, employment, sub-contracting systems and trade practices in different sectors of industry. Origin of industry and its growth trends. Industrial/trade policies and role of various developmental organisations. International trade in footwear in relation to leather manufactures, export procedures, incentives, duties and major importing countries and competitors.

TOTAL : 45 PERIODS**COURSE OUTCOMES:**

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

- CO1. Understand the organizational management associated with footwear sector
- CO2. Have knowledge on man/machine relationship
- CO3. Aware about the Consumer psychology

Attested

REFERENCES:

1. Boon, G.K., "Technology and employment Footwear Manufacturing", Sijthoff and Noordhoff, Published by BRILL, 1980.
2. Mehta, P., "Managerial Economics", Sultan Chand Co., 1985.
3. Shukla, M.C., "Business Organization & Management", Sultan Chand & Co, Published by Progoti publishers, 1969.
4. Rugman, A.M. "International Business Firm Environment", Mcgraw-Hill., New York, Published by Taylor and Francis, 2002.
5. "Employment and working conditions and Competitiveness in the Leather and Footwear Industry", ILO, Report II, Published by international labour organization, Geneva, 1995.
6. Kanawaty, G., "Introduction to work study", Published by International Labour Organisation, 1992.



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Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Understand the organizational management associated with footwear sector	-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3
CO2	Have knowledge on man/machine relationship	-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3
CO3	Aware about the Consumer psychology	-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3
Organisation and Management of Footwear Sector		-	2	3	2	3	-	-	-	-	-	-	-	-	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVE

The objective of this course is present the complications associated with foot and strategies to fabricate appropriate footwear

UNIT I INTRODUCTION 5

Pedorthics – Role of Pedorthist – Pedorthic evaluation – Patient management -implementation and Practice management.

UNIT II FOOT DEFORMITIES AND LOCOMOTION 10

Descriptive knowledge on High arches, Flat feet, Forefoot varus, Calluses, Plantar fasciitis, Metatarsalgia, Mortons neuroma, Hallux valgus, Hallux Rigidus, Hammer or Claw toes, Heel spur, Talgia, Frequent ankle sprains. Gait analysis-gait cycle, Gait patterns. Types of forces friction,

UNIT III FOOT ORTHOSES 10

Orthoses; Raw material- Kind of foot orthoses - Fabrication techniques and Finishing. Clinical management.

UNIT IV FOOT COMPLICATIONS AND LIFESTYLE DISEASES 7

Enumeration of Lifestyle diseases such as Diabetes, Obesity etc; Foot related complications; Risk levels of foot ; Foot characteristics – low risk to high risk; Principles of therapeutic footwear and Bio-mechanical principles in design and development of footwear.

UNIT V CORRECTIVE FOOTWEAR FABRICATION TECHNOLOGY 13

Overview-Footwear modifications - Heel modifications - Heel and Sole wedges - Customization of fit parameters – Stretching – Widening – Lengthening - Internal volume changes - Rocker bottom - Facilitation of entry and closure - Alterations including rebuilding, relasting, Shoe repair and shoe refurbishing.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of this course the students will be able

- CO1. To understand the foot deformities.
- CO2. To know about the need/means for the development of specialty footwear.
- CO3. Have knowledge on fabrication techniques of corrective footwear.

REFERENCES:

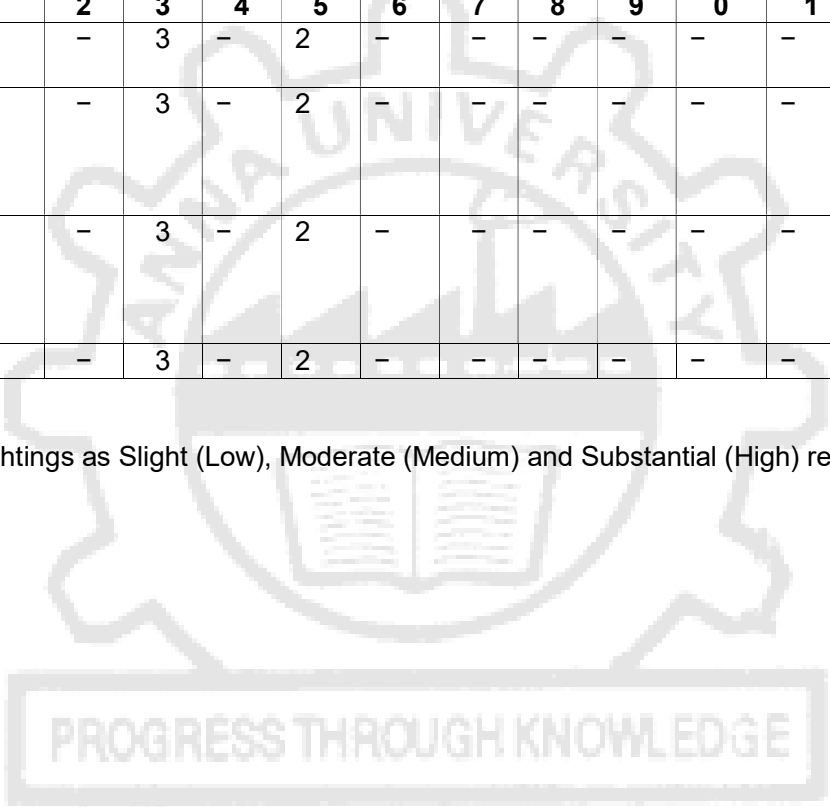
1. D.J.Morton, The Human Foot, Hafner Publishing Co, New York, London, 1964.
2. C A Edwards, Orthopaedic shoe Technology, Precision Printing Co., Indiana, 1981
3. Micheal W Whittle, "Gait Analysis: An introduction," Butterwolrth-HeinemannPublication.
4. J.H. Thornton, Text book of Footwear Manufacture-National trade Press Ltd, London, 1970.

Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	To understand the foot deformities	2	-	3	-	2	-	-	-	-	-	-	-	2	-	-	3
CO2	To know about the need/means for the development of specialty footwear	2	-	3	-	2	-	-	-	-	-	-	-	2	-	-	3
CO3	Have knowledge on fabrication techniques of corrective footwear	2	-	3	-	2	-	-	-	-	-	-	-	2	-	-	3
Pedorthic Footwear		2	-	3	-	2	-	-	-	-	-	-	-	2	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OBJECTIVES

- To enable the students to learn the Production Operations Management
- To make the students understand the steps involved in production operation Management.

UNIT I MODELLING AND OPERATIONS

7

Transformation process model: Inputs, process and outputs; Classification of operations; Responsibilities of Operations Manager; New Product Development, Selection and Design of Product / Services.

UNIT II PROCESS FLOW STRUCTURE

8

Process types in manufacturing: project, jobbing, batch, line, mass, continuous; Process types in services: professional services, services shops, mass services; Plant location; Layout planning.

UNIT III PRODUCTION, PLANNING AND CONTROL

10

Production Planning & Control: Production planning techniques for various process choices, techniques of production control, aggregate planning techniques,

UNIT IV QUALITY MANAGEMENT

10

Quality management: Introduction; Meaning; Quality characteristics of goods and services; Tools and techniques for quality improvement: check sheet, histogram, scatter diagram, cause and effect diagram, Pareto chart, process diagram, statistical process control chart; Quality assurance; Total quality management (TQM) model; Service quality, concept of Six Sigma and its application.

UNIT V PRODUCTIVITY IMPROVEMENT TECHNIQUES

10

Productivity Improvement Techniques: Work study; Method study; Work measurement: time study: stop watch time study; Work sampling.

Maintenance: maintenance policies for facilities and equipment; Time of failure; Preventive versus breakdown maintenance;

Procedure for maintenance, total productive maintenance (TPM)

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

Upon successful completion of this course, students should be able to:

CO1. Apply techniques to measure quality control.

CO2. Understand the importance of forecasting and able to apply mathematical forecasting techniques.

CO3. Understand the problems involved in inventory management and concepts of operations scheduling.

REFERENCES:

1. Adam Jr Everetl E. R J – Production and Operations Management (Prentice-Hall, 1992), 2000 5th ed.
2. Chary- Production and Operations Management (Tata McGraw-Hill, 2006 3rd edition)
3. Hill T- Operations Management (Palgrave McMillan, 2006, 2nd Edition)
4. Johnston R et al – Cases in Operations Management (Prentice Hall, 2002, 3rd edition)
5. McGregor D – Operations Management (McGraw-Hill, 1960) Morton- Production and Operations Management (Vikas)
6. Haleem A- Production and Operations Management (Galgotia books, 2005)
7. Shanker Ravi- Industrial Engineering (Galgotia Publications, 2000)
8. Chase - Production and operation Management, Irwin Professional Publishing, 1995, 6th edition.
9. Kanishka Bedi - Production & Operations Management. (Oxford University Press, 3rd edition, 2013)

Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Apply techniques to measure quality control	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO2	Understand the importance of forecasting and able to apply mathematical forecasting techniques	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
CO3	Understand the problems involved in inventory management and concepts of operations scheduling.	-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2
Production Operations Management		-	2	2	-	3	-	2	2	-	-	-	-	2	-	-	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

FW5011	QUALITY CONTROL MANAGEMENT IN FOOTWEAR INDUSTRIES	L	T	P	C
		3	0	0	3

OBJECTIVE

The objective of this course is present students on the quality control and management aspects associated with footwear manufacture.

UNIT I CONCEPTS OF QUALITY 9

Definition of quality, quality control theory, fundamentals of statistics and probability, confidence intervals, testing significance, statistical process control techniques, analysis, defect diagnosis and prevention.

UNIT II QUALITY IMPROVEMENT 9

Concepts of TQM, TQC, KANBAN, Zero defects, JIT – continuous improvement – HRD in quality management – quality grades, Dr. Deming’s 14 points management concept, TQA.

UNIT III STANDARDIZATION 9

Historical development of standards, aims techniques, management, formulations, implementation of international and national standards – economic benefits.

UNIT IV QUALITY ASSURANCE SYSTEM 9

Introduction to ISO – 9000 and 14000 and related international /national standards, case study.

UNIT V ACCREDITATION AND CERTIFICATION BODIES 9

Relevant standards, internal and external audit, corrective action, remedies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course the students will be able

- CO1. To understand the requirement of different quality control and management tools and their application in footwear manufacture.
- CO2. Apply structured problem-solving statistical techniques and tools to improve quality in the leather sector.
- CO3. Aware of various accreditation and certification bodies.

REFERENCES:

1. A. J. Duncan, "Quality Control and Industrial Statistics", Homewood, Illinois, Published by Irwin, 1986.
2. "International Organization for Standardization" case postale 56, CH-1211-Geneva – 20, Switzerland.
3. "Bureau of Indian Standards", New Delhi.

Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	To understand the requirement of different quality control and management tools and their application in footwear manufacture	-	2	3	-	2	-	-	-	-	-	2	-	2	-	-	2
CO2	Apply structured problem-solving statistical techniques and tools to improve quality in the leather sector	-	2	3	-	2	-	-	-	-	-	2	-	2	-	-	2
CO3	Aware of various accreditation and certification bodies.	-	2	3	-	2	-	-	-	-	-	2	-	2	-	-	2
Quality Control Management in Footwear Industries		-	2	3	-	2	-	-	-	-	-	2	-	2	-	-	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively

LE5073	SELF MANAGEMENT AND ENTREPRENEURSHIP	L T P C
	“Syllabus is in Common with M.Tech (Leather Technology) Programme”	3 0 0 3

OBJECTIVE

To provide understanding on the need to self-manage and other management competency for a successful entrepreneurship.

UNIT I SELF-MANAGEMENT 12

Defining self-management - Writing a mission statement - Self-discipline - Self-evaluation - Self-analysis by personal SWOT; Planning & Goal setting; Developing a career plan

UNIT II BUSINESS DEVELOPMENT 9

Intellectual property and copyright; Trademarks and patents; Types of businesses – Pvt, Public, Partner; Business development report - Institutions & organization for business development;

UNIT III FINANCE MANAGEMENT 9

Pricing your work & budgeting; Building an online portfolio; Branding; Networking and Partnership building; The elevator pitch Fundraising; Establishing a value network

UNIT IV TIME MANAGEMENT 6

Time management; Project management; Time map and project management plan; Reflection on perfectionism

UNIT V MARKETING MANAGEMENT 9

Publicity and advertising; Press releases; Digital and social media marketing

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, one can

- CO1. Differentiate between multiple leadership styles and ways of managing individuals
- CO2. Recognize the various roles of managers and types of business management
- CO3. Identify the fundamentals of managing the time and finance

REFERENCES:

1. Brigham, Ehrhardt, Financial Management Theory & Practice, 14th edition, Cengage Learning.
2. Samuel J. Mantel, Jr, Jack R. Meredith, Scott M. Shafer, Margaret M. Sutton, M.R. Gopalan, “Project Management – Core Textbook” First Indian Edition (2006), Wiley India publication, 2011.
3. Philip Kotler, Kevin Lane Keller, Abraham Koshy, and MitheleswarJha, “Marketing Management”, 13th Edition, Pearson Publications Limited.2012.

Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	Differentiate between multiple leadership styles and ways of managing individuals	-	2	3	-	-	-	-	3	2	-	2	-	-	-	-	2
CO2	Recognize the various roles of managers and types of business management	-	2	3	-	-	-	-	3	2	-	2	-	-	-	-	2
CO3	Identify the fundamentals of managing the time and finance	-	2	3	-	-	-	-	3	2	-	2	-	-	-	-	2
Self Management and Entrepreneurship		-	-	3	-	-	-	-	-	2	-	2	-	-	-	-	2

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



FW5012	TECHNOLOGY FOR SPECIALTY AND NON LEATHER FOOTWEAR	L T P C
		3 0 0 3

OBJECTIVE

The objective of this course is to present the students on the technology of specialty and non-leather footwear

UNIT I GOOD YEAR WELTED CONSTRUCTION 5

Principle of Good Year Welled construction; preparation of uppers; Insoles – Rib attaching – Sewing in welt sole attaching – Variation in the welted method. Finishing and machinery

UNIT II STITCHDOWN AND OTHER CONSTRUCTION 12

Principle and methodology of Stitchdown Construction. Upper preparation- The machine & sewn method; Veldtschoen construction: Veldtschoen – Turnshoes– Direct vulcanization process and Direct Moulding process

UNIT III SPORTS AND MOULDED FOOTWEAR 10

Footwear's for sports. Relation between surface, activity and footwear. Materials and method of construction Preparation of uppers, sequence of operations, sponge rubber, moulded on slippers, soled rubber moulded on footwear, thermoplastic injection moulded on footwear, cellular polyurethane moulded on footwear, Health and Safety

UNIT IV ORTHOPEDIC AND THERAPEUTIC FOOTWEAR 10

Need of Pedorthic and anatomically-correction, friction reduction and comfort qualities, offloading technique, materials and construction, evaluation technique

UNIT V SAFETY SHOES 8

Requirements, Manufacturing techniques and Characterization of Safety shoes; Specification of safety shoes for different types of industries- mining, steel, etc.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course the students will be able

- CO1. To understand the techniques in making non-leather.
- CO2. Have knowledge in fabrication of sports and safety footwear.
- CO3. Have knowledge in fabrication of orthopedic and therapeutic footwear.

REFERENCES:

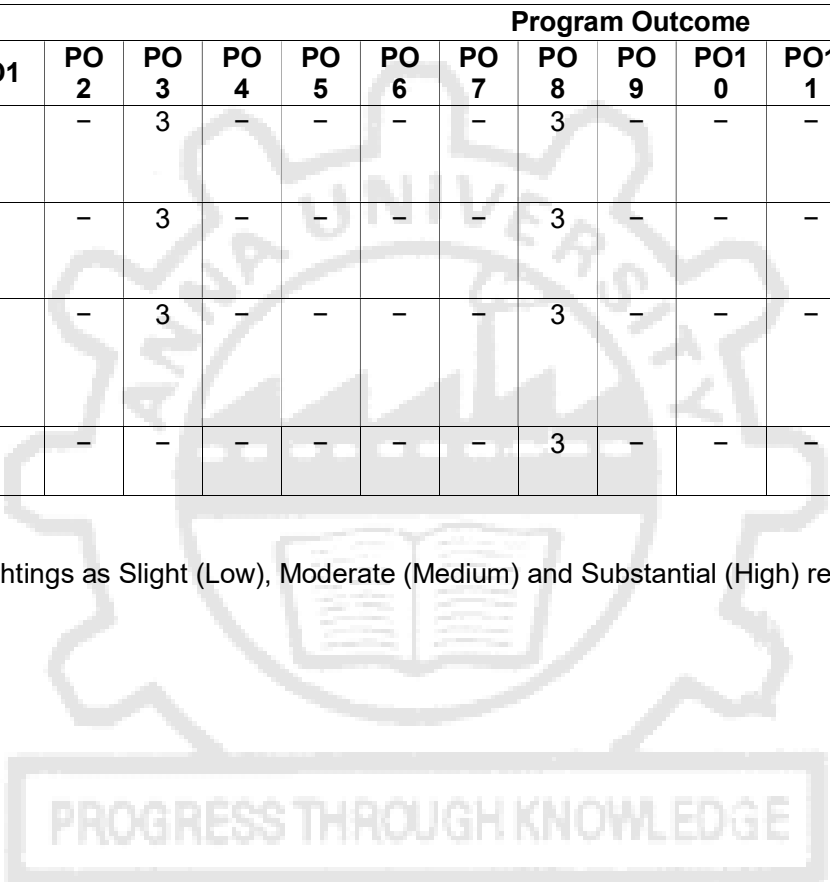
1. Thornton, J.H., "Text book of footwear Manufacture", National Trade Press Book Ltd., London, 1970.
2. Skoggard, I.A., "Modern Shoe Making– Lasting", SATRA Publication, Sharpe, 1996
3. Miller, R.G., "Manual of Shoe Making", Clarks Ltd., London, 1978.

Attested

Course Articulation Matrix:

Course Outcomes	Statement	Program Outcome															
		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3	PSO 4
CO1	To understand the techniques in making non-leather	3	-	3	-	-	-	-	3	-	-	-	-	3	-	-	3
CO2	Have knowledge in fabrication of sports and safety footwear	3	-	3	-	-	-	-	3	-	-	-	-	3	-	-	3
CO3	Have knowledge in fabrication of orthopedic and therapeutic footwear	3	-	3	-	-	-	-	3	-	-	-	-	3	-	-	3
Technology for Specialty and Non Leather Footwear		3	-	-	-	-	-	-	3	-	-	-	-	3	-	-	3

1, 2 and 3 are correlation levels with weightings as Slight (Low), Moderate (Medium) and Substantial (High) respectively



OPEN ELECTIVE COURSES (OEC)

OE5091

BUSINESS DATA ANALYTICS

L T P C
3 0 0 3

OBJECTIVES:

- To understand the basics of business analytics and its life cycle.
- To gain knowledge about fundamental business analytics.
- To learn modeling for uncertainty and statistical inference.
- To understand analytics using Hadoop and Map Reduce frameworks.
- To acquire insight on other analytical frameworks.

UNIT I OVERVIEW OF BUSINESS ANALYTICS

9

Introduction – Drivers for Business Analytics – Applications of Business Analytics: Marketing and Sales, Human Resource, Healthcare, Product Design, Service Design, Customer Service and Support – Skills Required for a Business Analyst – Framework for Business Analytics Life Cycle for Business Analytics Process.

Suggested Activities:

- Case studies on applications involving business analytics.
- Converting real time decision making problems into hypothesis.
- Group discussion on entrepreneurial opportunities in Business Analytics.

Suggested Evaluation Methods:

- Assignment on business scenario and business analytical life cycle process.
- Group presentation on big data applications with societal need.
- Quiz on case studies.

UNIT II ESSENTIALS OF BUSINESS ANALYTICS

9

Descriptive Statistics – Using Data – Types of Data – Data Distribution Metrics: Frequency, Mean, Median, Mode, Range, Variance, Standard Deviation, Percentile, Quartile, z-Score, Covariance, Correlation – Data Visualization: Tables, Charts, Line Charts, Bar and Column Chart, Bubble Chart, Heat Map – Data Dashboards.

Suggested Activities:

- Solve numerical problems on basic statistics.
- Explore chart wizard in MS Excel Case using sample real time data for data visualization.
- Use R tool for data visualization.

Suggested Evaluation Methods:

- Assignment on descriptive analytics using benchmark data.
- Quiz on data visualization for univariate, bivariate data.

UNIT III MODELING UNCERTAINTY AND STATISTICAL INFERENCE

9

Modeling Uncertainty: Events and Probabilities – Conditional Probability – Random Variables – Discrete Probability Distributions – Continuous Probability Distribution – Statistical Inference: Data Sampling – Selecting a Sample – Point Estimation – Sampling Distributions – Interval Estimation – Hypothesis Testing.

Suggested Activities:

- Solving numerical problems in sampling, probability, probability distributions and hypothesis testing.
- Converting real time decision making problems into hypothesis.

Suggested Evaluation Methods:

- Assignments on hypothesis testing.
- Group presentation on real time applications involving data sampling and hypothesis testing.
- Quizzes on topics like sampling and probability.

Attested

UNIT IV ANALYTICS USING HADOOP AND MAPREDUCE FRAMEWORK 9

Introducing Hadoop– RDBMS versus Hadoop–Hadoop Overview – HDFS (Hadoop Distributed File System) – Processing Data with Hadoop– Introduction to MapReduce – Features of MapReduce – Algorithms Using Map-Reduce: Matrix-Vector Multiplication, Relational Algebra Operations, Grouping and Aggregation – Extensions to MapReduce.

Suggested Activities:

- Practical – Install and configure Hadoop.
- Practical – Use web based tools to monitor Hadoop setup.
- Practical – Design and develop MapReduce tasks for word count, searching involving text corpus etc.

Suggested Evaluation Methods:

- Evaluation of the practical implementations.
- Quizzes on topics like HDFS and extensions to MapReduce.

UNIT V OTHER DATA ANALYTICAL FRAMEWORKS 9

Overview of Application development Languages for Hadoop – PigLatin – Hive – Hive Query Language (HQL) – Introduction to Pentaho, JAQL – Introduction to Apache: Sqoop, Drill and Spark, Cloudera Impala – Introduction to NoSQL Databases – Hbase and MongoDB.

Suggested Activities:

- Practical – Installation of NoSQL database like MongoDB.
- Practical – Demonstration on Sharding in MongoDB.
- Practical – Install and run Pig
- Practical – Write PigLatin scripts to sort, group, join, project, and filter data.
- Design and develop algorithms to be executed in MapReduce involving numerical methods for analytics.

Suggested Evaluation Methods:

- Mini Project (Group) – Real time data collection, saving in NoSQL, implement analytical techniques using Map-Reduce Tasks and Result Projection.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of the course, the student will be able to:

- Identify the real world business problems and model with analytical solutions.
- Solve analytical problem with relevant mathematics background knowledge.
- Convert any real world decision making problem to hypothesis and apply suitable statistical testing.
- Write and Demonstrate simple applications involving analytics using Hadoop and MapReduce
- Use open source frameworks for modeling and storing data.
- Apply suitable visualization technique using R for visualizing voluminous data.

REFERENCES:

1. VigneshPrajapati, "Big Data Analytics with R and Hadoop", Packt Publishing, 2013.
2. Umesh R Hodeghatta, UmeshaNayak, "Business Analytics Using R – A Practical Approach", Apress, 2017.
3. AnandRajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
4. Jeffrey D. Camm, James J. Cochran, Michael J. Fry, Jeffrey W. Ohlmann, David R. Anderson, "Essentials of Business Analytics", Cengage Learning, second Edition, 2016.
5. U. Dinesh Kumar, "Business Analytics: The Science of Data-Driven Decision Making", Wiley, 2017.
6. A. Ohri, "R for Business Analytics", Springer, 2012
7. Rui Miguel Forte, "Mastering Predictive Analytics with R", Packt Publication, 2015.

Attested

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	1	1	2	3	1
CO2	2	1	1	2	1	1
CO3	1	1	2	3	3	1
CO4	2	2	1	2	1	1
CO5	1	1	2	2	1	1
CO6	1	1	1	3	2	1



Attested

OBJECTIVES:

- Summarize basics of industrial safety
- Describe fundamentals of maintenance engineering
- Explain wear and corrosion
- Illustrate fault tracing
- Identify preventive and periodic maintenance

UNIT I INTRODUCTION 9

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT II FUNDAMENTALS OF MAINTENANCE ENGINEERING 9

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT III WEAR AND CORROSION AND THEIR PREVENTION 9

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT IV FAULT TRACING 9

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT V PERIODIC AND PREVENTIVE MAINTENANCE 9

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

TOTAL: 45 PERIODS**OUTCOMES:**

- CO1: Ability to summarize basics of industrial safety
 CO2: Ability to describe fundamentals of maintenance engineering
 CO3: Ability to explain wear and corrosion
 CO4: Ability to illustrate fault tracing
 CO5: Ability to identify preventive and periodic maintenance

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2	✓											
CO3	✓	✓	✓									
CO4	✓	✓	✓									
CO5	✓	✓	✓									

Attested

REFERENCES:

1. Audels, Pump-hydraulic Compressors, Mcgrew Hill Publication, 1978.
2. Garg H P, Maintenance Engineering, S. Chand and Company, 1987.
3. Hans F. Winterkorn, Foundation Engineering Handbook, Chapman & Hall London, 2013.
4. Higgins & Morrow, Maintenance Engineering Handbook, Eighth Edition, 2008

OE5093**OPERATIONS RESEARCH****L T P C****3 0 0 3****OBJECTIVES:**

- Solve linear programming problem and solve using graphical method.
- Solve LPP using simplex method
- Solve transportation, assignment problems
- Solve project management problems
- Solve scheduling problems

UNIT I LINEAR PROGRAMMING 9

Introduction to Operations Research – assumptions of linear programming problems - Formulations of linear programming problem – Graphical method

UNIT II ADVANCES IN LINEAR PROGRAMMING 9

Solutions to LPP using simplex algorithm- Revised simplex method - primal dual relationships – Dual simplex algorithm - Sensitivity analysis

UNIT III NETWORK ANALYSIS – I 9

Transportation problems -Northwest corner rule, least cost method, Voges's approximation method - Assignment problem -Hungarian algorithm

UNIT IV NETWORK ANALYSIS – II 9

Shortest path problem: Dijkstra's algorithms, Floyds algorithm, systematic method -CPM/PERT

UNIT V NETWORK ANALYSIS – III 9

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models

TOTAL: 45 PERIODS**OUTCOMES:**

CO1: To formulate linear programming problem and solve using graphical method.

CO2: To solve LPP using simplex method

CO3: To formulate and solve transportation, assignment problems

CO4: To solve project management problems

CO5: To solve scheduling problems

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2	✓											
CO3	✓	✓	✓									
CO4	✓	✓	✓									
CO5	✓	✓	✓									

REFERENCES:

1. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010
2. Hitler Libermann, Operations Research: McGraw Hill Pub. 2009
3. Pant J C, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Pannerselvam, Operations Research: Prentice Hall of India 2010
5. Taha H A, Operations Research, An Introduction, PHI, 2008

OBJECTIVES:

- Summarize the costing concepts and their role in decision making
- Infer the project management concepts and their various aspects in selection
- Interpret costing concepts with project execution
- Develop knowledge of costing techniques in service sector and various budgetary control techniques
- Illustrate with quantitative techniques in cost management

UNIT I INTRODUCTION TO COSTING CONCEPTS 9

Objectives of a Costing System; Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost; Creation of a Database for operational control.

UNIT II INTRODUCTION TO PROJECT MANAGEMENT 9

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities, Detailed Engineering activities, Pre project execution main clearances and documents, Project team: Role of each member, Importance Project site: Data required with significance, Project contracts.

UNIT III PROJECT EXECUTION AND COSTING CONCEPTS 9

Project execution Project cost control, Bar charts and Network diagram, Project commissioning: mechanical and process, Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis, Various decision-making problems, Pricing strategies: Pareto Analysis, Target costing, Life Cycle Costing.

UNIT IV COSTING OF SERVICE SECTOR AND BUDGETARY CONTROL 9

Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis, Budgetary Control: Flexible Budgets; Performance budgets; Zero-based budgets.

UNIT V QUANTITATIVE TECHNIQUES FOR COST MANAGEMENT 9

Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Learning Curve Theory.

TOTAL: 45 PERIODS**OUTCOMES**

- CO1 – Understand the costing concepts and their role in decision making
 CO2– Understand the project management concepts and their various aspects in selection
 CO3– Interpret costing concepts with project execution
 CO4– Gain knowledge of costing techniques in service sector and various budgetary control techniques
 CO5 - Become familiar with quantitative techniques in cost management

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓			✓	✓		✓	✓
CO2	✓	✓	✓		✓				✓		✓	✓
CO3	✓	✓	✓		✓	✓					✓	✓
CO4	✓	✓	✓		✓		✓				✓	✓
CO5	✓	✓	✓		✓	✓	✓				✓	✓

REFERENCES:

1. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher, 1991
2. Charles T. Horngren and George Foster, Advanced Management Accounting, 1988
3. Charles T. Horngren et al Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi, 2011
4. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting, 2003
5. Vohra N.D., Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd, 2007

Attested

OBJECTIVES:

- Summarize the characteristics of composite materials and effect of reinforcement in composite materials.
- Identify the various reinforcements used in composite materials.
- Compare the manufacturing process of metal matrix composites.
- Understand the manufacturing processes of polymer matrix composites.
- Analyze the strength of composite materials.

UNIT I INTRODUCTION**9**

Definition – Classification and characteristics of Composite materials - Advantages and application of composites - Functional requirements of reinforcement and matrix - Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT II REINFORCEMENTS**9**

Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers - Properties and applications of whiskers, particle reinforcements - Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures - Isostrain and Isostress conditions.

UNIT III MANUFACTURING OF METAL MATRIX COMPOSITES**9**

Casting – Solid State diffusion technique - Cladding – Hot isostatic pressing - Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving - Properties and applications.

UNIT IV MANUFACTURING OF POLYMER MATRIX COMPOSITES**9**

Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding - Properties and applications.

UNIT V STRENGTH**9**

Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TOTAL: 45 PERIODS**OUTCOMES:**

- CO1 - Know the characteristics of composite materials and effect of reinforcement in composite materials.
- CO2 – Know the various reinforcements used in composite materials.
- CO3 – Understand the manufacturing processes of metal matrix composites.
- CO4 – Understand the manufacturing processes of polymer matrix composites.
- CO5 – Analyze the strength of composite materials.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓	✓								
CO2		✓✓	✓	✓	✓						✓	
CO3			✓	✓	✓		✓				✓	
CO4			✓	✓	✓		✓				✓	
CO5				✓	✓		✓					

Attested

REFERENCES:

1. Cahn R.W. - Material Science and Technology – Vol 13 – Composites, VCH, WestGermany.
2. Callister, W.D Jr., Adapted by Balasubramaniam R, Materials Science and Engineering, An introduction, John Wiley & Sons, NY, Indian edition, 2007.
3. Chawla K.K., Composite Materials, 2013.
4. Lubin.G, Hand Book of Composite Materials, 2013.

OE5096**WASTE TO ENERGY****L T P C
3 0 0 3****OBJECTIVES:**

- Interpret the various types of wastes from which energy can be generated
- Develop knowledge on biomass pyrolysis process and its applications
- Develop knowledge on various types of biomass gasifiers and their operations
- Invent knowledge on biomass combustors and its applications on generating energy
- Summarize the principles of bio-energy systems and their features

UNIT I INTRODUCTION TO EXTRACTION OF ENERGY FROM WASTE 9

Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

UNIT II BIOMASS PYROLYSIS 9

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT III BIOMASS GASIFICATION 9

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT IV BIOMASS COMBUSTION 9

Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT V BIO ENERGY 9

Properties of biogas (Calorific value and composition), Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production -Urban waste to energy conversion - Biomass energy programme in India.

TOTAL: 45 PERIODS**OUTCOMES:**

- CO1 – Understand the various types of wastes from which energy can be generated
 CO2 – Gain knowledge on biomass pyrolysis process and its applications
 CO3 – Develop knowledge on various types of biomass gasifiers and their operations
 CO4 – Gain knowledge on biomass combustors and its applications on generating energy
 CO5 – Understand the principles of bio-energy systems and their features

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓									✓
CO2	✓		✓									✓
CO3	✓	✓	✓		✓							✓
CO4	✓	✓	✓		✓		✓					✓ <i>Attended</i>
CO5	✓	✓	✓		✓							✓

REFERENCES:

1. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.



Attested

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AUDIT COURSES (AC)

AX5091

ENGLISHFOR RESEARCHPAPERWRITING

L T P C

2 0 0 0

OBJECTIVES

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT I INTRODUCTION TO RESEARCH PAPER WRITING

6

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II PRESENTATION SKILLS

6

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III TITLE WRITING SKILLS

6

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV RESULT WRITING SKILLS

6

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V VERIFICATION SKILLS

6

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first-time submission

TOTAL: 30 PERIODS

OUTCOMES

- CO1 –Understand that how to improve your writing skills and level of readability
CO2 –Learn about what to write in each section
CO3 –Understand the skills needed when writing a Title
CO4 – Understand the skills needed when writing the Conclusion
CO5 – Ensure the good quality of paper at very first-time submission

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										✓		✓
CO2										✓		✓
CO3										✓		✓
CO4										✓		✓
CO5										✓		✓

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1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

Attested

OBJECTIVES

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT I INTRODUCTION 6

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II REPERCUSSIONS OF DISASTERS AND HAZARDS 6

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III DISASTER PRONE AREAS IN INDIA 6

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT 6

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V RISK ASSESSMENT 6

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

TOTAL :30 PERIODS

OUTCOMES

- CO1: Ability to summarize basics of disaster
 CO2: Ability to explain critical understanding of key concepts in disaster risk reduction and humanitarian response.
 CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
 CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
 CO5: Ability to develop the strengths and weaknesses of disaster management approaches

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2	✓											
CO3	✓	✓	✓									
CO4	✓	✓	✓									
CO5	✓	✓	✓									

Attested

REFERENCES

1. Goel S. L., Disaster Administration And Management Text And Case Studies”, Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2. Nishitha Rai, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “New Royal book Company,2007.
3. Sahni, Pardeep Et.Al. ,” Disaster Mitigation Experiences And Reflections”, Prentice Hall Of India, New Delhi,2001.

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SANSKRIT FOR TECHNICAL KNOWLEDGE

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OBJECTIVES

- Illustrate the basic sanskrit language.
- Recognize sanskrit, the scientific language in the world.
- Appraise learning of sanskrit to improve brain functioning.
- Relate sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power.
- Extract huge knowledge from ancient literature.

UNIT I	ALPHABETS	6
Alphabets in Sanskrit		
UNIT II	TENSES AND SENTENCES	6
Past/Present/Future Tense - Simple Sentences		
UNIT III	ORDER AND ROOTS	6
Order - Introduction of roots		
UNIT IV	SANSKRIT LITERATURE	6
Technical information about Sanskrit Literature		
UNIT V	TECHNICAL CONCEPTS OF ENGINEERING	6
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics		

TOTAL: 30 PERIODS

OUTCOMES

- CO1 - Understanding basic Sanskrit language.
- CO2 - Write sentences.
- CO3 - Know the order and roots of Sanskrit.
- CO4 - Know about technical information about Sanskrit literature.
- CO5 - Understand the technical concepts of Engineering.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										✓		✓
CO2										✓		✓
CO3												✓
CO4												✓
CO5												✓

REFERENCES

1. “Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi, 2017.

Attested

OBJECTIVES

Students will be able to

- Understand value of education and self-development
- Imbibe good values in students
- Let the should know about the importance of character

UNIT I

Values and self-development–Social values and individual attitudes. Workethics, Indianvision of humanism. Moralandnon-moralvaluation. Standards and principles. Value judgements

UNIT II

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love fornature, Discipline

UNIT III

Personality and Behavior Development-Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour.

Universal brother hood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT IV

Character and Competence–Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

TOTAL: 30 PERIODS**OUTCOMES**

Students will be able to

- Knowledge of self-development.
- Learn the importance of Human values.
- Developing the over all personality.

Suggested reading

1. Chakroborty, S.K.“Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

PROGRESS THROUGH KNOWLEDGE

Attested

OBJECTIVES

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
- Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I HISTORY OF MAKING OF THE INDIAN CONSTITUTION:

History, Drafting Committee, (Composition & Working)

UNIT II PHILOSOPHY OF THE INDIAN CONSTITUTION:

Preamble, Salient Features

UNIT III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES:

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT IV ORGANS OF GOVERNANCE:

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT V LOCAL ADMINISTRATION:

District's Administration head: Role and Importance, • Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI ELECTION COMMISSION:

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reform sliding to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

Suggested reading

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Attested

OBJECTIVES

Students will be able to:

- Review existing evidence on their view topic to inform programme design and policy
- Making under taken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

UNIT I INTRODUCTION AND METHODOLOGY:

Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions - Overview of methodology and Searching.

UNIT II THEMATIC OVERVIEW

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

UNIT III EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES

Methodology for the in depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? - Theory of change - Strength and nature of the body of evidence for effective pedagogical practices - Pedagogic theory and pedagogical approaches - Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT IV PROFESSIONAL DEVELOPMENT

Professional development: alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the community - Curriculum and assessment - Barriers to learning: limited resources and large class sizes

UNIT V RESEARCH GAPS AND FUTURE DIRECTIONS

Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to understand:

- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of the pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Suggested reading

1. Ackers, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36(3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33(3): 272-282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf

Attested

OBJECTIVES

- To achieve overall health of body and mind
- To overcome stress

UNIT I

Definitions of Eight parts of yoga.(Ashtanga)

UNIT II

Yam and Niyam - Do's and Don't's in life - i) Ahinsa, satya, astheya, bramhacharya and aparigraha, ii) Ahinsa, satya, astheya, bramhacharya and aparigraha.

UNIT III

Asan and Pranayam - Various yog poses and their benefits for mind & body - Regularization of breathing techniques and its effects-Types of pranayam

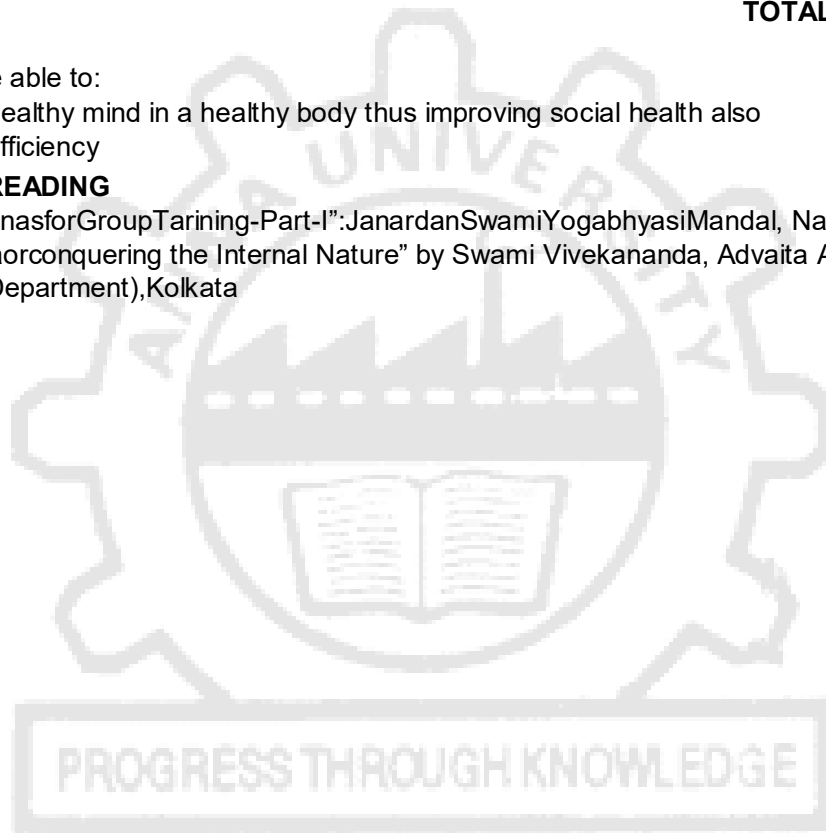
TOTAL: 30 PERIODS**OUTCOMES**

Students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

SUGGESTED READING

1. 'Yogic Asanas for Group Training-Part-I': Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata



Attested

OBJECTIVES

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To a waken wisdom in students

UNIT I

Neetishatakam-holistic development of personality - Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) – Verses- 26,28,63,65 (virtue) - Verses- 52,53,59 (dont's) - Verses- 71,73,75,78 (do's)

UNIT II

Approach to day to day work and duties - Shrimad BhagwadGeeta: Chapter 2-Verses 41, 47,48 - Chapter 3-Verses 13, 21, 27, 35 Chapter 6-Verses 5,13,17,23, 35 - Chapter 18-Verses 45, 46, 48.

UNIT III

Statements of basic knowledge - Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 -Personality of role model - shrimadbhagwadgeeta - Chapter2-Verses 17, Chapter 3-Verses 36,37,42 - Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63

TOTAL: 30 PERIODS**OUTCOMES**

Students will be able to

- Study of Shrimad- Bhagwad- Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and man kind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students.

Suggested reading

1. Gopinath, Rashtriya Sanskrit Sansthanam P, Bhartrihari's Three Satakam, Niti-sringar-vairagya, New Delhi,2010
2. Swami Swarupananda , Srimad Bhagavad Gita, Advaita Ashram, Publication Department, Kolkata, 2016.



PROGRESS THROUGH KNOWLEDGE

Attested