



BANGLADESH TECHNICAL EDUCATION BOARD

**4-YEAR DIPLOMA-IN-ENGINEERING
PROGRAM**

FOOTWEAR TECHNOLOGY (698)

**SYLLABUS
SEVENTH SEMESTER**

Footwear Technology (698)

7th Semester

SI No	Sub. Code	Name of the Subject	T	P	C	Marks				Total
						Theory		Practical		
						TC	TF	PC	PF	
1	69871	Footwear Design and Pattern Making - II	3	3	4	60	90	25	25	200
2	69872	Leather Technology - II	2	3	3	40	60	25	25	150
3	69873	Footwear Machinery	3	3	4	60	90	25	25	200
4	69874	Production Planning and Quality Control (PPQC)	3	3	4	60	90	50	-	200
5	69875	Industrial and Production Engineering	2	3	3	40	60	25	25	150
6	69876	Footwear Engineering Project	0	6	2	-	-	50	50	100
Total =			13	21	20	260	390	200	150	1000

Objectives:

- To know the key principles of shoe designing
- To know the design and pattern making of moccasin shoe
- To know the design and pattern making of casual shoe
- To know the design and pattern making of sports footwear
- To know the design and pattern making of boot
- To know the design and pattern making of safety footwear
- To know the grading system of footwear pattern

Short Description:

To provide an overview and idea about design and pattern making of moccasin shoe, casual shoe, sports footwear, boot and safety footwear with performing the related tasks. Students will understand to perform and develop the design and pattern making of different types footwear manufacture.

DETAIL DESCRIPTION:**Theory:**

- 1. Determine the key principles of shoe designing**
 - 1.1 Identify the back and quarter height for making the footwear comfortable.
 - 1.2 Determine the length of tongue in shoe designing
 - 1.3 Justify the importance of elastic gussets on slip on footwear
 - 1.4 State the designing of facing for wider or narrower feet.
 - 1.5 Discuss the impact of volume in forepart of the shoe
 - 1.6 Estimate the length of toe cap for making the shoe comfortable.
 - 1.7 Estimate throat and side heights for adequate foot coverage in security
- 2. Interpret design and pattern making of moccasin shoe**
 - 2.1 Define moccasin shoe
 - 2.2 Classify moccasin shoe
 - 2.3 Sketch moccasin shoe
 - 2.4 Describe the patterns for various types of moccasin shoe
 - 2.5 Describe the steps for designing and pattern making of moccasin shoe
 - 2.6 Explain the advantages and disadvantages of moccasin shoe
- 3. Demonstrate design and pattern making of casual shoe**
 - 3.1 Explain the meaning of casual shoe
 - 3.2 State the advantages and uses of casual shoe.
 - 3.3 Describe the upper parts of casual shoe.

- 3.4 Outline the designing criteria of casual shoe
- 3.5 Differentiate between moccasin and casual shoe
- 3.6 Describe the steps for making upper patterns for casual shoe

4. Understand design and pattern of sports footwear

- 4.1 Identify sports footwear
- 4.2 Mention the requirements of sports footwear
- 4.3 Sketch the sports footwear
- 4.4 State the benefits of footwear design in injury prevention
- 4.5 Justify the types of footwear for specific sports
- 4.6 Describe the parts and patterns of sports footwear
- 4.7 Outline the steps for designing and pattern making of sports footwear.

5. Demonstrate designing and pattern making of boot

- 5.1 Define boot
- 5.2 Differentiate between shoe and boot
- 5.3 Classify boot
- 5.4 Sketch boot
- 5.5 List the different parts and patterns of boot
- 5.6 Justify the long heel and short heel measurements of the last in designing boot
- 5.7 Explain the necessity of toe spring in boot
- 5.8 Describe the steps for making patterns of ankle and long boot.

6. Interpret design and pattern making of safety footwear

- 6.1 Define safety, protective and occupational footwear
- 6.2 Mention the safety features of safety footwear
- 6.3 State the types of safety footwear
- 6.4 Describe the name of parts and patterns of safety footwear
- 6.5 State the procedure of designing and pattern making of safety footwear

7. Demonstrate hand and machine grading system for footwear pattern

- 7.1 Define pattern grading.
- 7.2 Classify grading
- 7.3 Explain the necessity of grading
- 7.4 Describe the process of hand grading used in footwear manufacture
- 7.5 Describe the process of machine grading used in footwear manufacture

Practical:

- 1. Construct standard for making sectional pattern of moccasin shoe
- 2. Generate a complete set of sectional patterns for upper, lining, bottom part and other components of moccasin shoe.
- 3. Construct standard for making sectional pattern of casual shoe

4. Generate a complete set of sectional patterns for upper, lining, bottom part and other components of Casual shoe.
5. Construct standard for making sectional pattern of sports footwear
6. Generate a complete set of sectional patterns for upper, lining, bottom part and other components of sports footwear.
7. Construct Standard for making sectional pattern of boot
8. Generate a complete set of sectional patterns for upper, lining, bottom part and other components of boot.
9. Construct Standard for making sectional pattern of safety footwear
10. Generate a complete set of sectional patterns for upper, lining, bottom part and other components of safety footwear.
11. Perform hand grading system for making footwear patterns of upper, lining, sole, insole and other components.
12. Perform machine grading system for making footwear patterns of upper, lining, sole, insole and other components.

Reference:

1. Introduction to the Modern Footwear Technology by Venkatappaiah B.
2. Manual of Shoe design- by CLRI.
3. Step by Step –The Pattern cutter’s Handbook- Michael H. Sharp
4. Pattern cutting and making up by Martin Shoben.
5. Manual of shoe making by R.G. Miller.
6. Text Book of Footwear Manufacture by J. H Thornton.

Objectives:

- To understand and demonstrate sorting and grading of leather
- To develop knowledge **and skill** on post tanning operations.
- To develop knowledge **and skill** on wetback and rechroming, neutralization, retanning, dyeing, and fat liquoring
- To be able to produce good quality crust and finished leather.

Short Description:

To provide knowledge and skills about sorting and gradation of leather, post tanning operations, wetback and rechroming, neutralization, retanning, dyeing, fat liquoring, drying and preparation of leather for finishing, and finishing. It also provides knowledge of machine operations involved in leather making and properties of different types of leather and their use.

DETAIL DESCRIPTION:**Theory:****1 Understand sorting and **grading** of leather**

- 1.1 Define sorting and grading of leather.
- 1.2 State the objectives sorting and grading of leather.
- 1.3 Differentiate between sorting and grading.
- 1.4 State the significance of sorting and grading in leather processing.

2 Interpret post tanning operations

- 2.1 Define post tanning operations.
- 2.2 State the objectives of post tanning operations.
- 2.3 Outline the unit operations and process involved in post tanning.
- 2.4 Discuss the mechanical operations involved prior to post tanning operations.

3 Demonstrate wetback and rechroming

- 3.1 Define rechroming.
- 3.2 Describe objectives of rechroming
- 3.3 Discuss chemicals used in wetback and rechroming.
- 3.4 Explain the influencing factors of rechroming.

4 Understand the importance of neutralization

- 4.1 Define neutralization.
- 4.2 State the objectives of neutralization.
- 4.3 Discuss the chemicals used in neutralization.
- 4.4 Explain the influencing factors of neutralization.
- 4.5 State the importance of neutralization.

5 Understand the concepts of retanning

- 5.1 Define retanning.
- 5.2 State the objectives of retanning.
- 5.3 Discuss the chemicals used in retanning.
- 5.4 Explain the influencing factors of retanning.

6 Understand dyes and dyeing

- 6.1 Define dye and dyeing.
- 6.2 State the objectives of dyeing.
- 6.3 Discuss the importance of leather dyeing.
- 6.4 Describe the controlling factors of dyeing.
- 6.5 Discuss the fixation of dye to leather
- 6.6 State the defects of leather dye to incorrect dyeing.

7 Understand the fat liquoring process

- 7.1 Mention the objectives of fat liquoring.
- 7.2 State the selection of fat liquoring agents.
- 7.3 Discuss the significance of fat liquoring.
- 7.4 Describe the controlling factors of fat liquoring.
- 7.5 Discuss the defects of fat liquoring.

8 Interpret the drying and preparation of leather for finishing

- 8.1 State types of drying.
- 8.2 Discuss the operations involved in drying.
- 8.3 List out the machinery required for drying
- 8.4 Describe preparation of leather for finishing.
- 8.5 Discuss the importance of drying and preparation of leather for finishing.

9 Understand leather finishing

- 9.1 Define finishing and finishes.
- 9.2 State the objectives of finishing.
- 9.3 Classify finishes.
- 9.4 Discuss the importance of leather finishing.
- 9.5 Sketch the structure of finish film.
- 9.6 Discuss the theory of film formation.
- 9.7 State the defects of leather finishing.
- 9.8 Interpret the value addition in leather finishing.

10 Understand machine operations involved in leather finishing

- 10.1 List machinery used in leather finishing.
- 10.2 State the functions of machinery used in leather finishing.
- 10.3 Discuss the controls of machinery used in leather finishing.
- 10.4 Discuss the importance of machines used in leather finishing.

Practical:

1. Produce shoe upper crust leather from wet blue performing the following tasks-

- 1.1 Selection of wet blue leather
- 1.2 Sammying
- 1.3 Splitting
- 1.4 Shaving
- 1.5 Wet back and rechroming
- 1.6 Neutralizing
- 1.7 Retanning
- 1.8 Dyeing
- 1.9 Fat liquoring
- 1.10 Fixing
- 1.11 Ageing
- 1.12 Setting out
- 1.13 Vacuum drying
- 1.14 Natural drying/Tunnel drying
- 1.15 Vibration staking
- 1.16 Toggle drying
- 1.17 Plating/**Ironing**

2. Produce nappa crust leather from wet blue performing the following tasks-

- 2.1 Selection of wet blue leather
- 2.2 Sammying
- 2.3 Splitting
- 2.4 Shaving
- 2.5 Wet back and rechroming
- 2.6 Neutralizing
- 2.7 Retanning
- 2.8 Dyeing
- 2.9 Fatliquoring
- 2.10 Fixing
- 2.11 Ageing
- 2.12 Setting out
- 2.13 Vacuum drying
- 2.14 Natural drying/Tunnel drying
- 2.15 Vibration staking
- 2.16 Dry milling
- 2.17 Toggle drying
- 2.18 Plating

3. Produce nubuck leather from wet blue performing the following tasks-

- 3.1 Selection of wet blue leather
- 3.2 Sammying

- 3.3 Splitting
- 3.4 Shaving
- 3.5 Wet back and rechroming
- 3.6 Neutralizing
- 3.7 Retanning
- 3.8 Dyeing
- 3.9 Fatliquoring
- 3.10 Fixing
- 3.11 Ageing
- 3.12 Setting out
- 3.13 Vacuum drying
- 3.14 Natural drying/Tunnel drying
- 3.15 Vibration staking
- 3.16 Toggle drying
- 3.17 Plating
- 3.18 Buffing
- 3.19 Snuffing
- 3.20 Refreshing

4. Manufacturing of suede leather from wet blue performing the following tasks-

- 4.1 Selection of wet blue leather
- 4.2 Sammying
- 4.3 Splitting
- 4.4 Shaving
- 4.5 Wet back and rechroming
- 4.6 Neutralizing
- 4.7 Retanning
- 4.8 Dyeing
- 4.9 Fatliquoring
- 4.10 Fixing
- 4.11 Ageing
- 4.12 Setting out
- 4.13 Vacuum drying
- 4.14 Natural drying/Tunnel drying
- 4.15 Vibration staking
- 4.16 Toggle drying
- 4.17 Plating
- 4.18 Buffing and snuffing
- 4.19 Refreshing

5. Manufacturing of drum dyed crust leather from raw hides performing the following tasks-

- 5.1 Selection of rawhides

- 5.2 Weighing
- 5.3 Soaking
- 5.4 Liming
- 5.5 Fleshing and unhairing
- 5.6 Deliming
- 5.7 Bating
- 5.8 Pickling
- 5.9 Chrome tanning
- 5.10 Ageing
- 5.11 Sammying
- 5.12 Splitting
- 5.13 Shaving
- 5.14 Wet back
- 5.15 Neutralizing
- 5.16 Retanning
- 5.17 Dyeing and fatliquoring
- 5.18 Fixing
- 5.19 Ageing
- 5.20 Setting out
- 5.21 Vacuum drying
- 5.22 Natural drying/Tunnel drying
- 5.23 Vibration staking
- 5.24 Toggle drying
- 5.25 Plating/Ironing

6 Produce aniline/ glaze kid finished leather from goat crust leather performing the following tasks-

- 6.1 Select crust leather
- 6.2 Select required chemicals
- 6.3 Dye staining
- 6.4 Spray coating
- 6.5 Polishing/Ironing
- 6.6 Top coat spraying
- 6.7 Glazing
- 6.8 Ironing

7 Produce semi-aniline finished leather from crust leather performing the following tasks-

- 7.1 Select crust leather
- 7.2 Select required chemicals
- 7.3 Dye staining
- 7.4 Spray coating
- 7.5 Polishing/Ironing
- 7.6 Top coat spraying
- 7.7 Ironing

8 Produce resin/pigment finished leather from crust leather performing the following tasks-

- 8.1 Select crust leather
- 8.2 Select required chemicals
- 8.3 Spray/Roller coating
- 8.4 Polishing/Ironing
- 8.5 Top coat spraying
- 8.6 Glazing
- 8.7 Ironing

References:

1. K.T. Sarkar-Theory and Practice of Leather Manufacture.
2. S.S. Dutta- An introduction to the principles of Leather Manufacture.
3. O'Flaherty, Roddy, Robert W.T.M. Lollar (Ed)-The Chemistry and Technology of Leather, Volume -1.
4. Gerhard John- Possible Defects in Leather Production.
5. R.Reed - Science for the students of the Leather Technology.
6. H.R. Proctor - The principles of Leather Manufacture.
7. JotirmayDey - Practical Aspects of the Manufacture of upper Leathers.
8. Leather Technicians Handbook- Sharp house.
9. Raw Hides & Skins: Structure, defects and curing, Noor Mohammad, the sky publishers, dhaka

Objectives:

- To know the machine and equipment used in designing and pattern making department
- To know the machine and equipment used in cutting and component department
- To know the machine and equipment used in stitching department
- To know the machine and equipment used in lasting and finishing department
- To know the machine and equipment used in packaging department

Short Description:

To provide an overview and knowledge about the parts and functions of the equipment and machineries used in footwear production. Students will understand to perform and maintain the machineries used in footwear industry.

DETAIL DESCRIPTION:**Theory:**

- 1. Understand machineries and equipment for designing and pattern making**
 - 1.1 Define 2D and 3D digitizer
 - 1.2 Explain CAD/CAM software for shoe designing and pattern making
 - 1.3 State the parts and functions of plotter
 - 1.4 Describe the parts and functions of Scanny 3D for last scanning.
- 2. Understand machineries and equipment for cutting and component department**
 - 2.1 Define and classify cutting machine
 - 2.2 List the parts and functions of swing arm, travelling head and beam press cutting machines.
 - 2.3 Outline the operational procedure for different types of cutting machines.
 - 2.4 State the advantages and disadvantages of different types cutting machines used in footwear production.
 - 2.5 Describe the parts and function of splitting, perforating, crimping, strap cutting, stamping, insole moulding, and edge beveling machines used in footwear production.
- 3. Understand machineries and equipment for preparation, fitting and stitching department**
 - 3.1 Define skiving machine
 - 3.2 Describe parts and functions of skiving machine
 - 3.3 Outline the operational procedure for skiving machine.
 - 3.4 Define heat fusing machine used in footwear production
 - 3.5 State parts and function of heat fusing machine
 - 3.6 State the operational procedure for heat fusing machine.
 - 3.7 Define and classify sewing machines used in footwear manufacture
 - 3.8 State parts and functions of flat bed, post bed, cylinder arm sewing machines

- 3.9 Describe parts and functions of sewing needle
- 3.10 Outline the toe puff attaching machine

4. Interpret machinery and equipment for lasting and finishing departments

- 4.1 Define back part moulding machine
- 4.2 Discuss the parts and functions of back part moulding machine
- 4.3 Outline the operational procedure for back part moulding machine.
- 4.4 Define mulling machine
- 4.5 Discuss the parts and functions of mulling machine
- 4.6 Outline the operational procedure for mulling machine.
- 4.7 Define toe lasting, seat and side lasting machine
- 4.8 Discuss the parts and functions of toe lasting, seat and side lasting machine
- 4.9 Outline the operational procedure for toe lasting, seat and side lasting machine.
- 4.10 Discuss the parts and function of Heat setting machine, Roughing and scouring machine, Heat reactivator, Sole press, Heel nailing machine, Brushing machine, Hand spraying machine, Chiller and Delasting machine

5. Understand machineries and equipment for packaging department

- 5.1 State the objectives of X-ray machine used in Footwear quality checking
- 5.2 Discuss the parts and function of X-ray machine
- 5.3 Outline the operational procedure of X-ray machine for quality control of footwear production.
- 5.4 State the objectives of using UV machine in footwear packaging
- 5.5 Discuss the parts and function of UV machine
- 5.6 Outline the operational procedure of UV machine for footwear shipment.

Practical:

1. Demonstrate the different parts of digitizer, CAD/CAM software, Scanny 3D, Plotter machine.
2. Demonstrate the different parts of cutting machine with their functions.
3. Perform cutting operation with the adjustment of different setting for different press knives.
4. Demonstrate the different parts of skiving machine with their functions.
5. Perform skiving operation with the adjustment of different setting for different types skiving.
6. Demonstrate the different parts of sewing machine with their functions.
7. Perform sewing operation with the adjustment of different setting for different types stitching.
8. Demonstrate the different parts of back part moulding machine with their functions.
9. Perform back part moulding operation with the adjustment of different setting.
10. Demonstrate the different parts of toe, seat and side lasting machine with their functions.
11. Perform lasting operation with the adjustment of different setting.
12. Demonstrate the different parts of heat setting machine with their functions.
13. Perform heat setting operation with the adjustment of different setting.

14. Demonstrate the different parts of Roughing and scouring machine, Heat reactivator, Sole press, Heel nailing machine, Brushing machine, Hand spraying machine, Chiller and delasting machine with their functions.
15. Perform Roughing and scouring, Heat reactivate, Sole press, Heel nailing, Brushing, Hand spraying, Chilling and delasting operation with the adjustment of different setting.
16. Demonstrate the different parts of UV machine with their functions.
17. Perform UV machine operation.

Note: Submit report

Reference:

1. R.S. Khurmi-A Text Book of Mechanical Technology.
2. Mark's Standard Handbook for Mechanical Engineers.
3. R.S. Khurmi-Workshop Technology
4. R.S. Khurmi,J.K. Gupta- Theory of Mechanics.

69874

**Production Planning & Quality Control
(PPQC)**

**T P C
3 3 4**

Objectives:

- To understand the principles and techniques for production planning and quality control
- To interpret new condition on a practical field for solving production problems.
- To analyze the production principles, techniques and their effect in production.
- To illustrate the importance of various activities involved in the method and planning of production.
- To evaluate the quality control management in relation with production planning.

Short Description:

Students will able to learn about production and production system, production planning, plant layout, equipment layout, operation of factory, production control, quality control, cost control, inventory control, materials handling, case study, productivity, quality control management and environmental management system.

DETAIL DESCRIPTION

Theory:

1 Understand production and production systems

- 1.1 Define production and production system.
- 1.2 Describe the scope and activity of production systems.
- 1.3 Describe the factors to be considered in production.
- 1.4 Distinguish among job, batch and mass production.
- 1.5 Describe the scale of production.
- 1.6 List merits and demerits of small scale production.
- 1.7 List the merits and demerits of large scale production.
- 1.8 State scope and importance of production.
- 1.9 Recognize elements of production, production planning.

2 Understand the importance and scope of production planning

- 2.1 Define production planning.
- 2.2 Describe importance of production planning.
- 2.3 State the different types and techniques of production planning.
- 2.4 Describe routing and scheduling procedures.
- 2.5 Discuss machine loading.
- 2.6 Describe products dispatching and follow up.
- 2.7 State the benefits of production planning.
- 2.8 Describe job planning, execution of job and monitoring.

3 Understand the importance of plant layout

- 3.1 Explain plant lay out.
- 3.2 Describe the fundamental factors of plant layout.
- 3.3 Describe production process layout.

- 3.4 Describe the different types of manufacturing plants.
- 3.5 Relate the influences of processes on plant layout.
- 3.6 Explain the necessity of studies of plant layout.
- 3.7 Illustrate activities and layout design.
- 3.8 Explain departmental space requirements and departmental arrangement.

4 Interpret the techniques involved in operation of factory

- 4.1 Define operation, operation sheet and operation schedule.
- 4.2 Prepare operation sheet.
- 4.3 Prepare operation schedule.
- 4.4 Distinguish between process chart and flow diagram.

5 Understand the importance of production control

- 5.1 Define production control.
- 5.2 Describe the factors involved in production control.
- 5.3 Narrate the advantages of production control.

6 Understand the importance of quality control and quality policy

- 6.1 Define quality control.
- 6.2 Describe objectives and principle of quality control.
- 6.3 Describe procedure of quality control.
- 6.4 Describe the benefits of quality control.
- 6.5 Discuss the role of quality control department.
- 6.6 State need for quality policies
- 6.7 Discuss corporate quality policies.
- 6.8 Explain quality policies for specific parameters.
- 6.9 Describe formulation of quality policies.
- 6.10 State Zero defects.

7 Understand the importance of cost control.

- 7.1 Define cost control.
- 7.2 State the objectives of cost control.
- 7.3 Describe the procedures of cost control.
- 7.4 Describe the advantages of cost control.

8 Understand the necessity of inventory control.

- 8.1 Define inventory control.
- 8.2 State the objectives of inventory control.
- 8.3 Describe the different types of inventory control methods.
- 8.4 State the advantages of inventory control.
- 8.5 Discuss inventory costs and control.
- 8.6 State lead-time, reorder point, economic order quantity (EOQ).
- 8.7 Explain inventory models under certainty, inventory control under risk.
- 8.8 Describe the effects of inventory control for store management.
- 8.9 State economic order quantity and economic lot size.
- 8.10 Determine economic order quantity and economic lot size.
- 8.11 State computer integrated production planning system.

- 8.12 Describe the elements of just in time system (JIT).
- 8.13 Classify stocks-raw hides and skins stock, wet-blue stock, crust and finished stock, stock-in-process, safety-stock, out of stock.

9 Understand the effects of material handling.

- 9.1 Define material handling.
- 9.2 State objectives of material handling.
- 9.3 Explain the factors to be considered for materials handling and handling equipment.
- 9.4 Classify material handling system.
- 9.5 Discuss materials handling layout.
- 9.6 Describe design of belt, chain conveyors.
- 9.7 Illustrate handling of raw materials.
- 9.8 Interpret handling of crust and finished leather.
- 9.9 Discuss handling of chemicals (adhesive, primer and coloring materials).
- 9.10 Classify handling equipment.
- 9.11 Classify conveyors.
- 9.12 Describe the uses and maintenance of conveyors.
- 9.13 Explain economic considerations of using conveyors and other devices.
- 9.14 Explain safety requirements.

10 Understand productivity concept.

- 10.1 Define productivity.
- 10.2 Distinguish between production and productivity.
- 10.3 Explain productivity measures.
- 10.4 Describe the factors influencing productivity.
- 10.5 Explain the productivity improvement techniques.

11 Understand total quality management (TQM)

- 11.1 State total quality management concept.
- 11.2 List out application of TQM on leather industry.
- 11.3 Describe internalization of quality.
- 11.4 Explain customer driven quality activity.
- 11.5 Narrate system development for TQM.
- 11.6 Discuss ideal TQM system.

12 Understand quality control management in footwear manufacturing

- 12.1 State quality control in pattern making operation.
- 12.2 Discuss quality control in cutting section operation (upper, lining, bottom material cutting).
- 12.3 Describe quality control in closing section operation.
- 12.4 Explain quality control in lasting section operation.
- 12.5 State quality control in shoe dressing operation.

13 Understand quality management system and environmental management system

- 13.1 State perceptions of quality.
- 13.2 Narrate development of ISO-9000 series.
- 13.3 Discuss content and application field of ISO-9000-9004 series.
- 13.4 State structure of the ISO 14001 standard.
- 13.5 Explain occupational health hazards and industries.

- 13.6 Describe environmental impact assessment (EIA) and audit.
- 13.7 Interpret environmental management plan.

Practical:

1. Design a plant layout for a footwear industry.
2. Construct a production planning for manufacturing 1000 pair footwear/day in a footwear industry.
3. Perform material handling in different department of footwear industry.
4. Interpret inventory management in footwear industry.
5. Perform quality control management in leather cutting.
6. Perform quality control management in synthetic cutting.
7. Perform quality control management in bottom material cutting.
8. Perform quality control management in closing operation.
9. Perform quality control management in sewing section.
10. Perform quality control management in lasting operation.
11. Perform quality control management in shoe dressing operation.
12. Perform different quality tools for finding errors and remedy actions in production system.

Note: Submit report

Reference:

01. European Organization of Quality Control; Glossary of Terms Used in Quality Control. Berne, Switzerland.
02. K.C Jain, L.N Aggarwal - Production Planning Control and Industrial management
03. Juran J.M, Gryna F.M - Juran's Quality Control Hand Book. McGraw-Hill Book Company.
04. Ott ; Process Quality Control.. McGraw-Hill Book Company.
05. Taylor - Quality Control Systems. McGraw-Hill Book Company.
06. Juran J. M.- Juran on Planning for Quality. The Free Press, New York.
07. UNIDO, Acceptable Quality standards in the Leather and Footwear Industry.

69875

Industrial & Production Engineering

T	P	C
2	3	3

Objectives:

- To apply knowledge and skills of industrial and production engineering.
- To understand the principles and techniques in industrial and production engineering.
- To implement the principles and techniques to conduct different studies.
- To interpret the production principles, techniques and their effect in production.
- To interpret the importance of familiarization with the various activities involved in the method and planning of production.

Short Description:

To provide knowledge and skills about concept of industrial engineering, production system, work study, method study, work measurement, ergonomics and work design, fatigue, boredom and monotony, value engineering, time study and motion study.

DETAIL DESCRIPTION

Theory:

1 Understand the concept of industrial engineering

- 1.1 Define industrial Engineering.
- 1.2 Describe the objectives of Industrial Engineering.
- 1.3 State the activities of Industrial Engineering.

2 Understand production system

- 2.1 Define production system.
- 2.2 Describe the productivity and performance.
- 2.3 State the earlier approaches to productivity.
- 2.4 Describe human relations approaches to productivity
- 2.5 Describe modern approaches to productivity
- 2.6 Discuss the causes of low productivity
- 2.7 Explain management and productivity techniques
- 2.8 Explain factors affecting productivity

3 Understand the work-study

- 3.1 Define work-study
- 3.2 Explain principles and procedures of work-study
- 3.3 Describe fields of work study
- 3.4 Discuss the procedures of Work study
- 3.5 Outline human factor in work-study

4 Understand method-study

- 4.1 Explain method-study

- 4.2 Discuss procedures of method study
- 4.3 List tools and techniques of method improvement process
- 4.4 Explain chart symbols
- 4.5 Analysis of method study
- 4.6 Explain SIMO Chart

5 Understand the critical work measurement

- 5.1 Define critical work measurement.
- 5.2 Uses critical work measurement.
- 5.3 Methods critical work measurement.
- 5.4 List the principles of time study.
- 5.5 Explain principles of motion study.
- 5.6 Discuss two-handed process charts.

6 Understand the ergonomics and work design

- 6.1 Describe introduction and concepts of ergonomics
- 6.2 Discuss ergonomics
- 6.3 State the advantages and disadvantage of ergonomics
- 6.4 Criticize body measurement
- 6.5 Sketch movement and work place design

7 Understand the fatigue, boredom and monotony

- 7.1 Define fatigue, boredom and monotony
- 7.2 Discuss the condition which creates or promotes fatigue
- 7.3 State the causes of boredom and monotony
- 7.4 Explain the reducing fatigue, boredom and monotony techniques

8 Understand the value engineering

- 8.1 Define value engineering
- 8.2 Discuss the function value engineering
- 8.3 State the benefits from value engineering work
- 8.4 Discuss creativity in value engineering
- 8.5 Explain the value engineering job plan

Practical:

- 1. Perform different tools and equipment required for work study.
- 2. Prepare a workstation layout as per production process.
- 3. Practice time study of various operations
- 4. Interpret motion study
- 5. Practice the motion study of different operators and operations
- 6. Measure work content in particular line of production
- 7. Illustrate ergonomics in upper closing department
- 8. Prepare two-handed process charts
- 9. Prepare a job plan with value engineering

Note: Submit report

References:

1. Production planning control and Industrial management - K. C. Jain and L. N. Aggarwal
2. Industrial Engineering and Production Management-Martand Telsang
3. K.C Jain, L.N Aggarwal - Production Planning Control and Industrial management
4. Juran J.M, Gryna F.M - Juran's Quality Control Hand Book. McGraw-Hill Book Company.
5. UNIDO, Acceptable Quality standards in the Leather and Footwear Industry.

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Footwear Engineering Project

T P C
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Objective:

- To be able to develop knowledge, skill and attitude to apply subject knowledge in manufacturing of footwear.
- To be able to develop knowledge, skill and attitude to determine the economic benefit of the produced components using footwear estimating subject.
- To be able to know that there are real possibilities for entrepreneurship and employment.

While doing the project work the following factors should be considered.

1. Component which is related to the footwear engineering should be undertaken for the project work.
2. A technical report will be prepared.
3. In order to manufacture the product, a project planning document should be prepared considering the following points:-
 - a. Pre Concept
 - b. Market survey for raw materials and accessories.
 - c. Equipment layout
 - d. Estimating
 - e. Flow diagram
 - f. Procurement of raw materials
 - g. Production processes
 - h. Costing of the product

Contents:

On the basis of the physical facilities and other facilities one or more than one product will be selected for production. The class teacher will act as manager and one or two students will act as foreman for the project class.

1. Perform the production and report writing of the perfect work.

- 1.1 Select any one or two products for the project work.
- 1.2 Make detailed working drawings of the selected product / products.
- 1.3 Prepare a list of raw-materials required for the manufacture of the product.
- 1.4 Draw a flow diagram of operations.
- 1.5 Set up relevant machines and equipment for producing the product.
- 1.6 Prepare a technical report on the project work / works on the basis of the following points:
 - a) Name of project.
 - b) Objectives
 - c) Requirements:
 - i. Machines
 - ii. Materials
 - iii. Detail working drawing and assembly drawing.
 - iv. Flow diagram of operation
 - d) Estimating
 - e) Manufacturing procedures
 - f) Direct cost, indirect cost and overhead cost
 - g) OSH (occupational safety and health)
 - h) Conclusion