

GUJARAT TECHNOLOGICAL UNIVERSITY

ENGINEERING ECONOMICS AND MANAGEMENT

SUBJECT CODE: 2140003

B.E. 3rd/4th SEMESTER

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits C | Examination Marks | | | | | | Total Marks |
|-----------------|---|----|--------------|-------------------|--------|-----|-----------------|---|-----------|----------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | | ESE (E) | PA (M) | | PA (V) | | PA (I) | |
| | | PA | ALA | | ESE | OEP | | | | |
| 3 | 0 | 0 | 3 | 70 | 20 | 10 | 0 | 0 | 0 | 100 |

Content:

| Sr. No | Topics | Hrs. | Module Weightage |
|--------|--|------|------------------|
| 1. | Introduction to Economics; Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity | 04 | 10% |
| 2. | Theory of production; production function, meaning, factors of production (meaning & characteristics of Land, Labour, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical | 04 | 10% |
| 3. | Markets; meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly) National Income; meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP, NDP, Personal income, disposal income. | 05 | 10% |
| 4. | Basic economic problems; Poverty-meaning, absolute & relative poverty, causes, measures to reduce Unemployment: meaning, types, causes, remedies Inflation; meaning, types, causes, measures to control | 04 | 10% |
| 5. | Money; meaning, functions, types, Monetary policy- meaning, objectives, tools, fiscal policy-meaning, objectives, tools Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR. | 04 | 10% |
| 6. | Introduction to Management; Definitions, Nature, scope Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory | 04 | 11% |
| 7. | Functions of Management; Planning, Organizing, Staffing, Directing, Controlling (meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization. | 05 | 11% |
| 8. | Introduction to Marketing management; Marketing Mix, concepts of marketing, demand forecasting and methods, market segmentation Introduction to Finance Management; meaning, scope, sources, functions | 05 | 11% |
| 9. | Introduction to Production Management; definitions, objectives, functions, plant layout-types & factors affecting it, plant location- factors affecting it. Introduction to Human Resource Management; definitions, objectives of manpower planning, process, sources of recruitment, process of selection | 05 | 11% |
| 10. | Corporate Social Responsibility; meaning, importance Business Ethics; meaning, importance. | 02 | 6% |

Reference Books:

1. Engineering Economics, R.Paneerselvam, PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
3. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
4. Principles and Practices of Management by L.M.Prasad
5. Principles of Management by Tripathy and Reddy
6. Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications

Course Outcomes: The course is intended to provide basic understanding of Economics and Management to engineering students with following aspects:

- To impart knowledge, with respect to concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions.
- To help the students to understand the fundamental concepts and principles of management; the basic roles, skills, functions of management, various organizational structures and basic knowledge of marketing.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory. The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE PROCESSING (28) TEXTILE MANUFACTURING II SUBJECT CODE: 2142806 B.E. SEMESTER IV

Type of course: Engineering

Prerequisite: Students should have knowledge of Textile Manufacturing I.

Rationale: This course covers the basics of Yarn preparation processes and different fabric formation techniques.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits C | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|--------------|-------------------|--------|-----|-----------------|----|-----------|----------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | | ESE (E) | PA (M) | | PA (V) | | PA (I) | |
| | | | | PA | ALA | ESE | OEP | | | |
| 3 | 0 | 2 | 5 | 70 | 20 | 10 | 20 | 10 | 20 | 150 |

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Content:

| Sr. No. | Topics | Teaching Hrs. | Module Weightage |
|---------|--|---------------|------------------|
| 1. | Warping Beam Warping; Slow speed warping; High speed warping; Modern warping pirn winders; Modern developments in Pirn winding; yarn traversing system; standard winding parameters; Calculations related to production; efficiency etc. | 6 | 17 % |
| 2. | Sectional Warping Old and Modern Machines | 4 | 11 % |
| 3. | Sizing Sizing Machines; Two cylinder sizing; Multi cylinder sizing | 4 | 11 % |
| 4. | Preparation of size paste for cotton, blended and Synthetic material | 2 | 6 % |
| 5. | Yarn Production Calculation | 2 | 6 % |
| 6. | Plain power loom: Primary, Secondary and Auxiliary motion; Types of Weaves | 4 | 11 % |
| 7. | Introduction to dobby and jacquard | 3 | 8 % |
| 8. | Non-Woven Technologies | 3 | 8 % |
| 9. | Knitting Technologies | 3 | 8 % |
| 10. | Garment Manufacturing Process | 2 | 6 % |
| 11. | Different Weft insertion Method (Shuttle, Airjet, Waterjet, Sulzer, Rapiet etc..) | 2 | 6 % |
| 12. | Recent Developments | 1 | 2 % |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks | | | | |
|------------------------------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level |
| 15 | 23 | 22 | 5 | 5 |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

1. Textile Warp Sizing – Sydel
2. Winding / Warping & Sizing / Loom Shed – BTRA
3. Preventive Maintenance Of Sizing Machines – BTRA
4. Cotton Warp Sizing Hand Book – Houghton
5. Plain Weaving Motions – Aswani
6. Watson's Textile Design & Colour - Grosicki
7. Weaving Productivity Standards & Methods of Evaluation – BTRA
8. Fancy Weaving Mechanisms – Aswini
9. Mechanisms Of Weaving – Fox
10. Weaving Mechanisms Vol. I & Vol. II – Banerjee
11. A Guide To Crimping / Texturising Technology - MANTRA

Course Outcome:

After learning the course the students should be able to

1. Know the basic requirements for formation of Warper's Beams suitable for Sizing process.
2. Know the preparation of size recipe suitable for different types of yarns.
3. Know the basic requirements for formation of Sized Beams suitable for subsequent processes like Drawing-in, Denting and weaving.
4. Understand different fabric manufacturing processes.
5. Calculate production and efficiency of various Machines.

List of Practical:

1. To study the objects and passage of material through Warping Machine.
2. To study the objects and passage of material through Sizing Machine.
3. To study the passage of warp on Plain power loom.
4. To study the primary, secondary and auxiliary motion on plain power loom.
5. To study the passage of material through Ruti C loom.
6. To study the passage of material through Airjet loom.
7. To study the passage of material through Waterjet loom.
8. To study the passage of material through Projectile Weaving Machine.
9. To study the passage of material through Rapier Weaving Machine.
10. To study the passage of material through Warp Knitting & Weft Knitting Machine.
11. To study the Garment Manufacturing Process.
12. To study different types of Stitches and Seams.
13. To study what is Non Woven and classification of Non woven.
14. To study recent developments.

Open Ended Problems/Design Oriented Problems: Apart from above experiments a group of students has to undertake one open ended problem/design problem. Few examples of the same are given below.

1. Develop a winding drum of Sectional Warping Machine.
2. Develop a shedding mechanism of Plain Power Loom.
3. Develop a weft insertion system of Rapier Loom.

Major Equipments:

Warping Machine

Sizing Machine

Plain power Loom

Automatic shuttle loom

Rapier loom

Airjet loom

List of Open Source Software/learning website: <http://nptel.iitm.ac.in>, World Wide Web, Google Search Engine etc.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE PROCESSING (28)

POLYMER CHEMISTRY

SUBJECT CODE: 2142807

B.E. SEMESTER IV

Type of course: Textile Processing Engineering

Prerequisite: Zeal to learn the subject

Rationale: This course provides a fundamental knowledge of various technochemical aspects of polymers. Thorough knowledge of polymer chemistry is highly indispensable to the students of textile processing as regards to the most of textile products are based on polymers.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|---------|-------------------|-----|--------|-----------------|--------|----|-------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | ESE (E) | PA (M) | | PA (V) | | PA (I) | | |
| | | | | PA | ALA | ESE | OEP | | | |
| 4 | 0 | 2 | 6 | 70 | 20 | 10 | 20 | 10 | 20 | 150 |

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Content:

| Sr. No. | Topics | Total Hrs. | Weightage (%) |
|---------|--|------------|---------------|
| 1. | Basic Concepts: Definition, Classification of Polymeric Material, General methods of preparation of polymers, Classifications of Polymerization reaction, Polymerization technique, Polymer structure - Polymer geometry, structural unit variety, Polymer tacticity, and Polymer utilization. | 10 | 21 |
| 2. | Polymer Reaction - Hydrolysis, Acidolysis, Hydrogenation, Addition & Substitution Reaction, cyclization, crosslinking etc. | 4 | 8 |
| 3. | Molecular weight of polymers: Different types and their methods of measurements | 2 | 5 |
| 4. | Analysis & testing of polymers - Chemical, Thermal Analysis, Spectroscopic method, X-ray diffraction, Microscopy | 4 | 8 |
| 5. | Scope, raw materials, preparation, structure, properties & important copolymers for the following chemical classes: Polyolefin - Polyethylene, Polypropylene, Butyl rubber, Polystyrene, Polyvinyl chloride, Polyvinyl acetate, Acrylic polymers, Polyamides & related polymers, Polyesters, Cellulose and related polymers, Silicones, Phenol - Formaldehyde polymers, Amino polymers, Polydiene and Natural rubber, Vulcanization, Epoxies etc | 20 | 42 |
| 6. | Polymer Processing - Plastic Technology, Elastomer | 4 | 8 |

| | | | |
|----|---|---|---|
| | Technology | | |
| 7. | Polymers & Environment: Pollution by polymers, Polymers & energy, Need of awareness for the future. | 4 | 8 |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks | | | | |
|------------------------------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level |
| 24 | 15 | 25 | 02 | 04 |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

| Sr. No. | Title | Author |
|---------|------------------------------|---|
| 1. | Organic Polymer Chemistry | J. Saunder, Chapman & Hall |
| 2. | Text Book of Polymer Science | Fred W. Billmeyer Jr. John Wiley & Sons |
| 3. | Polymer Science | V. R. Govariker, N. V. Vishvanathan, Jaydev Shreedhar |
| 4. | The Chemistry of Polymers | W. Nicholson, Royal Society Of Chemistry |

Course outcome:

After learning the course the students should be able to:

1. Understand the fundamentals of polymer chemistry such as polymerization steps, types of polymerization, methods of polymerization etc.
2. Understand the structural aspects polymers,
3. Understand physical and chemical properties of polymers,
4. Applications of different polymers used in textiles and allied domain,
5. Able to analyze and characterize various polymers,
6. Understand the various possessing techniques,
7. Understand the impact of polymers from its manufacturing to end uses on environment and routed to minimize their negative effect.

List of Experiments:

1. To measure the density of given polymer samples using density gradient column.
2. To determine viscosity average molecular weight of given polymer.
3. To determine the melting temperature of given polymer samples.
4. To determine the refractive indices of given polymer samples.
5. To determine melt flow rate of given polymer using melt flow indexer.
6. To synthesize polyacrylamide from acryl amide by solution polymerization method using free radical initiator.
7. To synthesize polyacrylic Sacid by solution polymerization method using free radical initiator.
8. To synthesize DMDHEU by polycondensation reaction.
9. To synthesize polymethylmethacrylate by emulsion polymerization method.
10. To prepare polystyrene by bulk polymerization method.
11. To prepare polystyrene by suspension polymerization method.
12. To prepare melamine formaldehyde precondensate.

Design based Problems (DP)/Open Ended Problem:

- To develop the polymer blend as per the requirement.
- To compare various polymerization techniques to get polymer with the best qualities.
- To study the effect of molecular weights of polymers on their various properties.
- To analyse the structure of polymers by various techniques.
- To study the effect on properties of polymers by analyzing the position of newly entering group by any polymer reaction.

Major Equipments:

Density gradient column, refractometer, melt flow indexer, Koflor hot bench, viscometer, oven, hot plate, magnetic stirrer, scientific balance etc.

List of Open Source Software/learning website:

1. <http://www.wto.org/>
2. <http://www.wtin.com/>
3. <http://textileinformation.blogspot.in/>
4. <http://www.fibre2fashion.com/>
5. <http://textilelearner.blogspot.in/>
6. <http://www.fashion-era.com/>

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GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE PROCESSING (28) SCOURING & BLEACHING – I SUBJECT CODE: 2142808 B.E. SEMESTER IV

Type of course: Textile Processing Engineering

Prerequisite: Zeal to learn the subject

Rationale: This subject involves the primary preparatory processes for textile wet processing of cotton textiles. It includes the fundamental and basic knowhow required to acknowledge the course. The coloration of textiles is only possible after following preparatory processes involved in the subject.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|---------|-------------------|-----|--------|-----------------|--------|----|-------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | ESE (E) | PA (M) | | PA (V) | | PA (I) | | |
| | | | | PA | ALA | ESE | OEP | | | |
| 4 | 0 | 3 | 7 | 70 | 20 | 10 | 20 | 10 | 20 | 150 |

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Content:

| Sr. No. | Course content | Total Hrs. | Weightage (%) |
|---------|---|------------|---------------|
| 01. | General introduction and objectives of preparatory processes of cotton fabric. An overview on various types of impurities present in cotton fabric | 3 | 6 |
| 02. | Preliminary inspection and mending of grey cotton fabric: lot number, sort number, spot cleaning, stitching, etc. | 3 | 6 |
| 03. | Shearing and Cropping: Importance, process and machinery | 2 | 4 |
| 04. | Singeing: Objective, methods, construction and working of different types of machines, advantages and disadvantages of these methods. | 3 | 6 |
| 05. | Desizing: Objective, different methods of desizing, chemistry and process, merits and demerits these desizing methods. | 5 | 9 |
| 06. | Scouring of white and coloured woven cotton goods: Technological routine, various ingredients, processes etc. | 8 | 14 |
| 07. | Bleaching of cotton fabric: Techno-chemical aspects, methods, parameters, ecological aspects and merits and demerits of following bleaching agents: Chlorinated bleaching agents-Calcium hypochlorite, Sodium hypochlorite etc: Formation of oxycellulose, hydrocellulose, copper number, cupraammonium fluidity, etc. | 10 8 | 18 14 |

| | | | |
|-----|---|---|---|
| | Peroxides- Hydrogen peroxide: Role and types of catalysts and stabilizers Peracetic acid | 2 | 4 |
| 08. | Machineries for scouring and bleaching of cotton fabric: Batch-wise, semi-continuous and continuous | 5 | 9 |
| 09. | Recent developments in processing methods and machineries for cotton preparatory processes | 2 | 4 |
| 10. | Principle, classification, chemistry and applications of optical brightening agents | 3 | 6 |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks | | | | |
|------------------------------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level |
| 24 | 15 | 25 | 04 | 02 |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

| Sr. No. | Title | Author |
|---------|---|----------------|
| 1. | Technology of bleaching and mercerizing, Vol.III | V. A. Shenai |
| 2. | Textile scouring and bleaching | E. R. Trotman |
| 3. | Textile chemistry, Vol. II | R.H. Peters |
| 4. | The chemical technology in the coloration of textiles, Vol. I | S. R. Karmakar |

Course outcome:

After learning the content of the subject the students will be able to understand:

1. About the impurities present in the fabric coming for processing
2. The requirements of dry preparatory processes like Grey inspection, stitching, shearing & cropping, singeing, etc.
3. The requirements of wet preparatory processes like desizing, scouring, bleaching, optical brightening, etc.
4. Analysis and Comparison of different methods for the said preparatory processes from inventory, environment and industrial point of view
5. Adopting the best method suitable as per the requirement
6. Surveying the alternative approaches e.g. continuous scouring & bleaching using continuous range, etc
7. About various machineries available for such processes

List of Experiments:

1. To carry out Acid Desizing of given cotton fabric.
2. To carry out Enzymatic Desizing of given cotton fabric.
3. To carry out Oxidative Desizing of given cotton fabric.
4. To carry out scouring of given desized cotton fabric. (Open Bath)
5. To carry out scouring of given desized cotton fabric. (Kier Scouring)
6. To study the effect of concentration of sodium hydroxide on scouring of desized cotton fabric.
7. To study the effect of concentration of sodium silicate on scouring of desized cotton fabric.
8. To carry out bleaching of given scoured cotton fabric using sodium hypochlorite.
9. To carry out bleaching of given scoured cotton fabric using hydrogen peroxide.
10. To carry out full bleaching of given scoured cotton fabric.

11. To carry out optical brightening of given bleached fabric.

Design based Problems (DP)/Open Ended Problem:

- Optimization of caustic soda concentration in scouring of cotton fabric.
- To study the effect of Sodium hypo chlorite concentration on strength of material in hypochlorite bleaching of cotton textiles.
- To study the effect of enzymes available from various sources on desizing efficiency.
- To determine the pH profile of various enzymes.
- To develop silicate free stabilizer for peroxide bleaching.

Major Equipments:

Water heating bath, kier, padding mangle, etc.

List of Open Source Software/learning website:

1. <http://www.wto.org/>
2. <http://www.wtin.com/>
3. <http://textileinformation.blogspot.in/>
4. <http://www.fibre2fashion.com/>
5. <http://textilelearner.blogspot.in/>
6. <http://www.fashion-era.com/>

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE PROCESSING (28) CHEMISTRY OF INTERMEDIATES & DYES SUBJECT CODE: 2142809 B.E. SEMESTER IV

Type of course: Textile Processing Engineering

Prerequisite: Zeal to learn the subject

Rationale: This course provides basic idea of different intermediates and their manufacturing processes, used in the synthesis of Dyes. It also gives the knowledge of classification of colourants, their properties and their application methods. Apart from textile, the other areas of applications of these colorants are also explored. The various ecotoxicological effects of synthetic dyes and the chemicals used therein are also covered.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|---------|-------------------|-----|--------|-----------------|--------|----|-------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | ESE (E) | PA (M) | | PA (V) | | PA (I) | | |
| | | | | PA | ALA | ESE | OEP | | | |
| 4 | 0 | 0 | 4 | 70 | 20 | 10 | 0 | 0 | 00 | 100 |

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Contents:

| Sr. No. | Topics | Total Hrs. | Weightage (%) |
|---------|--|------------|---------------|
| 01. | Color - Definition, colorimetric terms and theories | 2 | 3 |
| 02. | Brief description of intermediates and primary intermediates | 2 | 3 |
| 03. | Orientation rules in benzene series. | 2 | 3 |
| 04. | Industrial synthesis of intermediates: Purity of raw materials, yield of product. | 2 | 3 |
| 05. | Description of individual unit processes: Sulphonation, Nitration, Halogenation, Oxidation, Reduction, Alkali fusion - Definition, Reagents, Bucherer reaction, Alkylation- Definition, Friedel crafts reaction, Diazotization | 10 | 20 |
| 06. | Classification and chemical constitution of dyes. Synthesis of dyes from intermediate compounds to mono & Diazo dyes, Coupling of diazotized amines, etc. | 10 | 20 |
| 07. | Characteristic properties, synthesis & application of Ionic & non-ionic dyes like Direct, Vat, Acid, Disperse, Azoic, etc. | 10 | 20 |
| 08. | Characteristic features, Synthesis & uses of dyes like Nitro dyes, Acridine & Azo dyes, etc. | 10 | 20 |
| 09. | Colourless dyes: Concept and classification of fluorescent dyes. | 2 | 4 |
| 10. | Non-textile dyes: Food, leather, paper, hair dyes, etc. | 2 | 4 |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks |
|------------------------------|
|------------------------------|

| | | | | |
|---------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level |
| 24 | 18 | 22 | 04 | 02 |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

| Sr. No. | Title | Author |
|---------|--|---------------|
| 01. | Chemistry of dyes & principles of dyeing | V. A. Shenai |
| 02. | Synthetic dyes | G. R. Chatwal |
| 03. | Colorants and pigments | John Shore |
| 04. | Modern technology of textile dyes and pigments | H. Panda |
| 05. | Handbook of synthetic dyes | A. M. Shah |

Course outcome:

After learning the course, the students should be able to:

1. Understand the basics of various raw materials and intermediates used in the manufacturing of Dyes.
2. Understand the technical aspects of various unit operations employed in the manufacturing of different intermediates.
3. Understand the basis of classification of different colouring matter.
4. Understand the technical aspects of different manufacturing methods employed in the synthesis of dyes.
5. Understand different application methods of dyes on textiles.
6. Get the knowledge of areas of non textile applications of Dyes such as leather, paper, food etc.
7. Understands the concept and classification of colorless dye e.g. Optical brightening agents.
8. Understand Color i.e. definition, colorimetric terms and different colour theories.
9. Get the knowledge of current scenario of Dyestuff industries.
10. Understand ecotoxicological effects of dyes and the chemical used therein on environment.

Major Equipments: NA

List of Open Source Software/learning website:

1. <http://www.wto.org/>
2. <http://www.wtin.com/>
3. <http://textileinformation.blogspot.in/>
4. <http://www.fibre2fashion.com/>
5. <http://textilelearner.blogspot.in/>
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GUJARAT TECHNOLOGICAL UNIVERSITY

TEXTILE PROCESSING (28) PROCESS CALCULATIONS IN TEXTILE WET PROCESSING SUBJECT CODE: 2142810 B.E. SEMESTER IV

Type of course: Textile Processing Engineering

Prerequisite: Zeal to learn the subject

Rationale: This gives knowledge essential for efficient working of machineries and equipments in the industries with optimum utilization of materials and energy. This ultimately helps in running the industry economically with the best utilization of resources.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|---------|-------------------|-----|--------|-----------------|--------|----|-------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | ESE (E) | PA (M) | | PA (V) | | PA (I) | | |
| | | | | PA | ALA | ESE | OEP | | | |
| 3 | 2 | 0 | 5 | 70 | 20 | 10 | 30 | 0 | 20 | 150 |

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment; OEP-Open Ended problem; AL-Active learning;

Content:

| Sr. No. | Course content | Total Hrs. | Weightage (%) |
|---------|--|------------|---------------|
| 01. | General Introduction: Scope of process calculation studies involving fluid flow and heat transfer in textile processing. Various processes and process equipments in textile processing industries. | 1 | 2 |
| 02. | Dimensions and units : Dimensions and system of units, Numericals based on the conversion factors of various units, Basic chemical calculations | 2 | 5 |
| 03. | Material balance without chemical reactions: Process flow sheet, materials around equipments related unit operations like driers, evaporators, extractors etc. | 4 | 10 |
| 04. | Material balance involving chemical reactions: Concept of limiting and excess reactants percentage conversion and yield, material balance involving chemical reactions with special reference to dyestuff and textile processing industries. | 4 | 10 |
| 05. | Stoichiometry and unit operations: industrial applications, Related calculations and numerical | 2 | 5 |
| 06. | Fluid flow: definition, classification of fluids, fluid properties like density, viscosity, surface tension, vapour pressure etc., Its importance in textile processing industries, numericals based on above topics. | 4 | 10 |
| 07. | Fluid statics: Principle and application of fluid statics, Newton's law of viscosity, Newtonian and non-Newtonian fluids, numerical based on it. | 2 | 5 |
| 08. | Fluid dynamics: Study of flow patterns, Reynolds experiments, | 5 | 12 |

| | | | |
|-----|--|---|----|
| | Reynolds number, rheological behavior of fluids, Poiseuille's equation, Bernoulli's equation, Pump work calculations, equations and numerical, Fluid flow for discharge through pipe, a small orifice and pumps | | |
| 09. | Fluid pressure and flow measurements: Manometer, mechanical gauges, numerical based on pressure measurement Ventury meter, Orifice meter, Rota meter, Pitot tubes and wires, numerical based on it | 4 | 10 |
| 10. | Heat transfer in Textile Processing Industries: modes of heat transfer, Textile Processing Machineries based on various modes of heat transfer such as open vessel dyeing machine, close vessel dyeing machines, agitated vessels, boiler, heat exchangers, stenters, driers based on conduction, convection and radiation, steamers and pressure agers, etc., principles, calculations and numerical related to all modes of heat transfer. | 9 | 20 |
| 11. | Heat Exchangers suitable in a Textile Process house, Fouling factor, log-mean temperature difference, effectiveness of heat exchangers, economizers, numerical based on these topics. | 5 | 11 |

Suggested Specification table with Marks (Theory):

| Distribution of Theory Marks | | | | |
|------------------------------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level |
| 10 | 10 | 14 | 22 | 14 |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

| Sr. No. | Title | Author |
|---------|---|---|
| 1. | Introduction to chemical engineering | W. L. Badger & J. L. Banchero |
| 2. | Unit operations of chemical engineering | W.L. Mc Cabe, J.C.Smith & Peter Harriot |
| 3. | Engineering in textile coloration | C. Duckworth |
| 4. | Process heat transfer | Kern |

Course outcome:

After learning the course the students should be able to:

1. Understand the various unit operations, unit process and process equipments used in textile processing industry.
2. Thoroughly understand the principles of material balance and stoichiometry.
3. Calculate the numericals related to material balance and stoichiometry
4. Understand the significance of studying principles of fluid flow and heat transfer for textile processing industries.
5. Get detail knowledge of various properties of fluids and their importance in textile processing industry.

6. Calculate out the numericals related to fluid properties like density, viscosity, surface tension, vapor pressure etc.
7. Understand fluid static and fluid dynamics.
8. Solve numerical problems related to static and fluid dynamics.
9. Get thorough knowledge of fluid flow measuring devices and calculations related to them.
10. Understand principles and modes of heat transfer and its significance in textile industry.
11. Solve the numerical problems related to efficiency of heat exchangers, economizers, stenters/driers, steamers, etc.

Major Equipments: NA

List of Open Source Software/learning website:

1. <http://www.wto.org/>
2. <http://www.wtin.com/>
3. <http://textileinformation.blogspot.in/>
4. <http://www.fibre2fashion.com/>
5. <http://textilelearner.blogspot.in/>
6. <http://www.fashion-era.com/>

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.