# Bachelor of Technology (Textile Technology)
## SCHEME OF STUDIES/EXAMINATIONS (KUK)



### Semester – III (w.e.f. Session 2016-2017)

| SN | Course No. | Course Title | Teaching Schedule (hrs) | | | | Allotment of Marks | | | | Dur.of Exam (hrs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Hrs/ Wk | Theory | Sessional | Practical | Total | |
| 1 | TT-201N | Introduction to Textiles | 3 | 1 | - | 4 | 75 | 25 | -- | 100 | 3 |
| 2 | TT-203N | Textile Fibre - I | 3 | 1 | - | 4 | 75 | 25 | -- | 100 | 3 |
| 3 | TT-205N | Yarn Manufacturing-I | 3 | 1 | - | 4 | 75 | 25 | -- | 100 | 3 |
| 4 | TT-207N | Fabric Manufacturing-I | 3 | 1 | - | 4 | 75 | 25 | -- | 100 | 3 |
| 5 | TT-209N | Textile Chemical Processing-I | 3 | 1 | - | 4 | 75 | 25 | -- | 100 | 3 |
| 6 | TT-211N | Textile Fibre - I Lab | - | - | 3 | 3 | -- | 40 | 60 | 100 | 3 |
| 7 | TT-213N | Yarn Manufacturing-I Lab | - | -- | 3 | 3 | -- | 40 | 60 | 100 | 3 |
| 8 | TT-215N | Fabric Manufacturing-I Lab | - | -- | 3 | 3 | -- | 40 | 60 | 100 | 3 |
| 9 | TT-217N | Textile Chemical Processing-I Lab | - | -- | 3 | 3 | -- | 40 | 60 | 100 | 3 |
| **Total** | | | **15** | **5** | **12** | **32** | **375** | **285** | **240** | **900** | |
| 10 | MPC-201N | Environmental Studies* | 3 | 0 | 0 | 3 | 75 | 25 | 0 | 100 | 3 |

*MPC-201N is a mandatory course and student has to get passing marks in order to qualify for the award of degree but its marks will not be added in the grand total.

# TT-201N
# INTRODUCTION TO TEXTILES

| L | T | P |
|---|---|---|
| 3 | 1 | - |

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3Hrs

**Note:** Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

## UNIT-I

**Textile Industry**

Sectors of textile industry viz, organized mill sector, decentralized small-scale sector. Sectors based on technology: Handloom, Powerloom, Garment, Cotton, Silk, Wool, Jute and Synthetic Fibers. Indian cotton: production, quality and global competition.

## UNIT-II

Changing scenario of Indian Textile Industry in the wake of WTO Agreement. Strengths and weaknesses of the Indian Textile Industry in the global scenario. Research and technology support to the Indian Textile Industry.

## UNIT-III

**Textile Technology**

Introduction to fiber, yarn, fabrics. Sequence of operation for conversion of natural and manmade fibers into finished fabrics. Fabric construction technology: knitting, weaving and production of non-wovens.

## UNIT-IV

Fabric to garment, Importance of Design. Quality aspects of yarns, fabrics and garments. Processing and finishing of fabric and garments.

**Suggested Text Books & References:**

1. Corbmann, “Textiles Fibre to Fabric”, New York Mc Graw Hill Book Co., 1983.
2. “Cotton Spinning”, ATIRA Publication, Ahmedabad.
3. Aswani,K.T., ”Plain Weaving Motions”, Mahajan Book Publishers,1996.
4. Shenai,V.A., ”Fundamental Principles of Textile Processing”, Sevak Publisher.

# TT-203N
# TEXTILE FIBRE – I

| L | T | P |
|---|---|---|
| 3 | 1 | - |

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3Hrs

**Note:** Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

## UNIT I

Fibre, textile fibre, Classification of textile fibres, Essential and desirable properties of textile fibres, Cotton - cultivation and harvesting Practices, ginning, grading, baling, Physical and chemical properties of cotton fibre.

## UNIT II

Cultivation, Production, morphological structure, physical and chemical properties and end uses of: Flax, Jute and Ramie.

## UNIT III

Production of silk (raw), Morphological structure of silk, chemical composition, physical and chemical properties of silk, various varieties of silk with brief description.

Wool - Sheep rearing, wool shearing, grading baling, Morphological structure, physical and chemical properties of wool.

## UNIT IV

Polymer system, physical and chemical properties and application of various man-made and regenerated fibres such as: viscose, polyester, polyamide, acrylic, polypropylene, elastomeric fibres (Spandex).

**Suggested Text Books & References:**

1. Moncriff, W., “Textile Fibres”.
2. Murthy, H.V.S., “Textile Fibres”.
3. Morton, M. and Hearle, J.W.S., “Physical properties of Textile Fibres”, Textile Institute, Manchester.
4. Marjoury Joseph, ‘Introduction of Textiles”.

# TT-205N
# YARN MANUFACTURING-I

| L | T | P |
|---|---|---|
| 3 | 1 | - |

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

**Note:** Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

**UNIT-I**
**Mixing & Blending**
Objectives of mixing and blending, Formulation of cotton mixing – scientific bale management, Different Blending methods with their advantages and disadvantages, Tinting & Application of additional spin finish for manmade fibres.

**UNIT-II**
**Opening and Cleaning**
Need for opening and cleaning, Objective of blowroom, Various types of opener and cleaner – construction and working, Lap forming mechanism, Blow room accessories, Selection of blow room line for different cotton and man-made fibres, Production and cleaning efficiency level attainable in blowroom, Causes of lap defects and their remedies, Modern developments in blowroom.

**UNIT-III**
**Carding**
Objective, Comparison of lap feed and flock feed system. Principle of carding, stripping and brushing action, Design and construction of carding machine, Flexible and metallic card clothing, Processing of man-made fibres on carding, Optimization of process and machine parameters of carding, Autolevelling in card. Modern developments in carding, Calculations pertaining to draft and production.

**UNIT-IV**
**Drafting**
Objective, Fundamental concept of Ideal drafting, Actual drafting, Working principles of draw frame including constructional details, Weighting in draw frame, Draft distribution, Different types of drafting roller arrangements, Relation between drafting & doubling, Drafting irregularities, Autolevelling, modern developments in draw-frame, Calculations pertaining to draft and production.

**Suggested Text Books & References:**

1. Klein, W., "Manual of Textile Technology: Vol. I. Technology of Short Staple Spinning", – Textile Institute, Manchester, 1998.
2. Klein, W., "Manual of Textile Technology: Vol. II. A practical Guide to Blowroom & Carding", – Textile Institute, Manchester, 2000.
3. Klein, W., "Manual of Textile Technology: Vol. III. A practical Guide to Combing & Drawing", – Textile Institute, Manchester, 1995.
4. Klein, W., "Manual of Textile Technology: Vol. VI. Manmade Fibres and their Processing", – Textile Institute, Manchester, 1994.
5. Oxtoby E, "Spun Yarn Technology", Butterworths, London, 1987.

6. Salhotra, K.R.and Chattopadhayay (Eds.), R., "Course Material of Pilot Programme on Spinning [illegible]oom and Card", NCUTE Publication, 1998.
7. Salhotra K R, "Spinning of Man Made Fibres and Blends on Cotton Spinning System",The Textile Association, Mumbai, 1989.
8. Foster G A R, "Manual of Cotton Spinning", Vol. I –IV, The Textile Institute,
9. Manchester, 1958.
10. Khare A R, "Elements of Blowroom, Carding and Drawframe", Sai book Centre,
11. Mumbai,1999.
12. Zaloski, S., "The Institute of Textiles Technology USA series on Textile Processing – Vol. I. Opening, Cleaning and Picking".
13. Taggart, W., "Handbook of Cotton Spinning" Universal Publishing Corporation, 1979.
14. Coulson (Ed.), A.F.W., "Manual of Cotton Spinning, Vol. I to IV", Textile Institute, Manchester, 1989.
15. Happey (Ed.), F., "Contemporary Textile Engineering", Academic Press, New York, 1981.
16. Lawrence C A, "Fundamental of Spun Yarn Technology" CRC Press, USA, 2003.
17. Booth J E, "Textile Mathematics", Part II, Textile Institute, Manchester, 1978.

# TT-207N
# FABRIC MANUFACTURING-I

| L | T | P |
|---|---|---|
| 3 | 1 | - |

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

**Note:** Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

## UNIT-1

**Warp Winding:**Object of warp winding, requirement of a good package, Basic features of a winding machine, Yarn withdrawal-side withdrawal, overend withdrawal, yarn tensioner, additive type tensioner, multiplicative type, combined type, yarn clearers, mechanical yarn clearer, electronic yarn clearer, yarn faults, uster classimate yarn fault measuring system, yarn rejoining techniques- knotting, splicing, classification of splicing, pneumatic splicing, classification of winding machines, random winding machine, principle, advantage and disadvantage of random winding, precision winding, principle, advantage and disadvantage of precision winding, angle of wind, coil angle, traverse ratio, coil pattern on the package, patterning and its remedy basic features of automatic winding machines, stop motions in winding machine, types of warp packages, types of package build calculation related to production and efficiency,

**Pirn Winding :**Objectives, Difference between warp winding and weft winding, yarn path on pirn winding machine, basic feature of pirn winding, difference in traverse mechanism in warp and weft winding , calculation related to production and efficiency

## UNIT-2

**Warping:** Object of warping process, classification of warping, creels used for warping process, beam warping, calculation related to beam warping, sectional warping, beaming, head stotck, relation between section height and cone angle, drum storage capacity, calculations related to sectional warping, various controls on warping machines, calculations related to production and efficiency

## UNIT-3

**Sizing:** Objectives, stresses on warp yarn during weaving, classification of sizing process, sizing parameters-size concentration, size percentage, size add-on, features of conventional slasher sizing machine, creels for sizing process, size boxes, drying section- single cylinder dryer and multi cylinder dryer, infrared dryers, head stock, controls on sizing machine, sizing materials, size preparation. Starch, modification of starch, polyvinyl alcohol, carboxyl methyl cellulose, acrylics, binders, lubricants and other additives, sizing of spun yarns, sizing of filament yarn, developments in sizing, single end sizing, cold and pre wet sizing, foam sizing, sinter roller sizing. Calculation related to sizing parameters, production and efficiency

## UNIT-4

**Drawing-In:** Object of drawing in, different types of heald wires, different types of drop wires, reed, reed count, drawing in order of plain weave, drawing in order of twill weave, drawing in order of satin weave, automation in drawing in, knotting and gaiting. Calculation related to reed count and drafting plan.

**Suggested Text Books & References:**

1. Talukdar, M.K., “An Introduction to Winding and Warping”, Textile Trade Press, Mumbai.
2. Ajgaonkar, D.B., “Sizing, Materials, Methods and Machines”, Textile Trade Press, Mumbai, 1982.
3. Banerjee, P.K., “Industrial Practices in Yarn winding”, NCUTE Publication, 1999.
4. Ramsbottom, “Warp Sizing Mechanisms”, Columbia Press, Manchester, 1965.
5. Ormerod, A., “Modern Preparation and Weaving Machinery”, Butterworths, 1983.
6. Aitken,”Automatic Weaving”, Columbia Press, Manchester, 1969.
7. Bennet, G.A., “An Introduction to Automatic Weaving”, Columbia Press, Manchester, 1958.

8. Gorder, V and Volkov, P., “Cotton Weaving”, Mir Publications, Moscow, 1987.
9. Sengupta, R., “Yarn Preparation Vol.-I & II”, Mahajan Publishers, Ahmedabad, 1970.
10. Singh, R.B.,”Modern Weaving Calculation, Vol-I Preparatory”, Mahajan Book Distributor, Ahmedabad, 1994.
11. SITRA Report on Work Methods of Conewinder Tenters.
12. BTRA Report on Winding.
13. BTRA Report on Warping and sizing.
14. Lord and Mohemad,”Conversion of Yarn to Fabric”.
15. Hougton,” Hand Book of Cotton Warp Sizing”.

# TT-209N
# TEXTILE CHEMICAL PROCESSING - I

| L | T | P |
|---|---|---|
| 3 | 1 | - |

Sessional: 25 Marks
Exam: 75 Marks
Total: 100 Marks
Time: 3 hrs

**Note:** Nine questions will be set in the question paper i.e. two from each unit. The students will be required to attempt one question from each unit. Question no. 1 is compulsory. It is objective type 15 questions of multiple choice covering all the four units.

**UNIT-1**

**Introduction:** Sequence of chemical processing of textiles. Natural and added impurities in textiles.

**Preparatory Processes:**

**Singeing:** Objective, types of singeing, details of various singeing methods with advantages and disadvantages. Evaluation method. Singeing machines.

**Desizing:** Objective, types, method details and mechanism of removal of starch in various methods. Efficiency of desizing.

**Scouring:** Objectives, mechanism of removal of impurities, recipe and controlling parameters involved. Scouring of natural, manmade and blended textiles. Evaluation of scouring efficiency. J-Box and kier machines.

**UNIT-2**

**Bleaching:** Objectives of bleaching. Hypochlorite, peroxide, chlorite and peracetic acid bleaching methods and their mechanism of action. Controlling parameter involved. Efficiency of bleaching.

**Mercerization:** Objectives, mechanism related to various physical and chemical changes in cotton during mercerisation. Process parameters involved in each method. Assessment of efficiency of mercerization: Barium activity number, its determination and interpretation. Different types of Mercerising machines.

**Heat setting:** Objectives and mechanism of heat setting. Different methods of heat setting and their effectivenes. Heat setting conditions and controls. Heat setting of polyester, nylon, acetate and their blends. Evaluation of degree of heat setting.

**UNIT-3**

**Dyeing of textiles:** Dyeing technology of natural and manmade textiles with Direct, Reactive, Vat, Insoluble Azoic, Sulphur, Solubilised vat, Acid, Metal-complex, Basic and Disperse dyes.

**Dyeing machineries:** Loose fibre, yarn and package dyeing machines. Jigger, winch, jet and HTHP beam dyeing m/cs. Padding mangles.

**UNIT-4**

**Wool Processing:** Wool setting and milling. Mildew, rot and moth proofing of wool.

**Silk Processing:** Degumming, Silk Finishing: Weighting of silk and Scroop finish.

**Suggested Text Books & References:**

1. Shenai,V.A.,"Technology of Textile Processing Vol. 2,3,4,6 and 10",Sevak Publisher,Bombay.
2. Marsh,J.T.,"Mercerising",Chapman Publication,London.
3. Marsh,J.T.,"An Introduction to Textile Finishing",Chapman Publication,London.
4. Trotman,E.R.,"Textile Technology and Dyeing of Textile Fibres",Griffin Publication,London.
5. Shenai,V.A.,"Principle and practice of Dyeing",Sevak Publisher,Bombay.
6. Shenai,V.A.,"Fundarmentals of Principles of Textile Wet processing",Sevak Publisher,Bombay.
7. Datye,K.V.and Vaidya,A.A.,"Chemical processing of Synthetic Fibres and Blends",Wiley Publication,New York.
8. Peter,R.H.,"Textile Chemistry Vol.2",Elsevier Publishing London.
9. Marsh,J.T."Textile Science",Chapman London.
10. Garde,A.R.and Modi,"Chemical Processing of Cotton and polyester Blend",ATIRA.Ahmadabad.
11. "Wet processing",ATTA Set,Textile Association of India.
12. Prayag.C.R.,"Dyeing of silk and Manmade Fibre".
13. Prayag,C.R.,"Bleaching,Mercerising and Dyeing of Cotton".

# TT-211N
# TEXTILE FIBRE - I LAB

| L | T | P |
|---|---|---|
| - | - | 3 |

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs

1. Identification of Cotton / Silk / Wool / Jute / Others Fibres using relevant instrument by physical methods.
2. Identification of Cotton / Silk / Wool / Jute / Others Fibres using relevant instrument by Chemical Methods.
3. Identification of Man made Fibres by Physical Methods
4. Identification of Man made Fibres by Chemical Methods.
5. Study and determine the TRASH contamination in the raw materials namely cotton.
6. Identification of different type of Dyes and Finishes from application technique & properties point of view.
7. A report on the sourcing & procurement of the textile raw material.
8. Prepare a cost comparison statement of at least
   (a) six fibres
   (b) six dyes
   (c) six textile auxiliaries
   (d) six chemicals.
9. Determination of Moisture Content & Moisture Regain of Material.
10. Determination of vegetable matter content, wax & Greece content of wool by Soxhlet method.
11. Determination of fiber length properties of cotton by using Comb Sorter & compare with the manual grading from ginning.
12. Determination % of medullation of wool using projection microscope.
13. Study the longitudinal & cross-sectional view of fiber.

**Note**: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

# TT-213N
# YARN MANUFACTURING-I LAB

| L | T | P |
|---|---|---|
| - | - | 3 |

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 Hrs

**Mixing**

1. To study the different techniques of Mixing and Blending.

**Opening & Cleaning**

2. Study of general outline of opener and clearer machine employed in a modern Blowroom line.

3. Calculation of speeds of different machine parts for Cotton and Synthetic fibres, Blow/inch of Kirschner beater, Production calculation of blow room.

**Carding**

4. To illustrate the working principle of carding machine.
5. To study the change places and speed of different parts of a carding machine for Cotton and Synthetic fibres.
6. Calculation of the speed, individual draft & total draft and production of carding machine.

**Drawframe**

7. To study the working principle and important settings of drawframe machine.
8. Calculation of the total draft and its distribution in draw frame machine.
9. Study of drafting arrangement and top roller weighting system of draw frame machine.

**Note**: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

# TT-215N
# FABRIC MANUFACTURING –I LAB

| L | T | P |
|---|---|---|
| - | - | 3 |

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3 hrs

**Winding**

1. To show different types of winders for single and Ply Yarn Final Packages.
2. Specification for all count range and material range, functions of all parts.
3. Cheese windings-Need and working.
4. To show the difference in packages needed for warping machines.

**Warping**

5. To show different type of warping machines used for different type of material and quality of fabric to be prepared. Functions of all parts.

**Pirn Winding**

6. To show working, functions of different types of Pirn Winding Machine.
7. Difference between cone winding and pirn winding.

**Sizing**

8. To show working explaining functions of different parts.
9. Different types of sizing materials used for different fibers.

**Drawing In**

10. To show different type of machines and use for different fabric design.

**Calculation**

11. To demonstrate actual use of weaving calculations in day-to-day use in different machines.

**Note**: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Ghaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

# TT-217N
# TEXTILE CHEMICAL PROCESSING- I LAB

| L | T | P |
|---|---|---|
| - | - | 3 |

Practical/viva: 60 Marks
Sessional: 40 Marks
Total: 100 Marks
Time: 3hrs

1. Desizing of cotton fabric using various types of desizing agents.
2. Scouring of Natural fibre in the form of yarn and fabric and find the scouring loss.
3. Scouring of Polyester/ Cotton /Blends and Wool.
4. Degumming of Silk and calculation of weight loss percentage.
5. Bleaching of Natural fibre namely Cotton, jute with
   (a) Hyperchloride Bleaching
   (b) Peroxide Bleaching
6. Bleaching of Polyester /Cotton Blend.
7. Determination the pH value of a given material.
8. Determination of transmittance, absorbance and concentration of given dye liquor by visible spectrophotometer.
9. Dyeing of cotton yarn with direct dyes, reactive dyes and basic dyes
10. Dyeing of wool with direct dyes, basic dyes, and acid dyes.
11. Method of mordanting in respect of application of different fibre.
12. Extraction method of color from different color dyes.
13. Study the mechanical finishing and understand the mechanism of mechanical finishing.
14. Understand the color difference in AATCC grey scale (1-5) between standard and batches
    (I) Manully with the comparison of grey scale, and
    (II) by computer color matching machine
    and interpretation of color sprectograph.
15. Print Different Material with relevant methods and style.
16. To do finishing of all type of materials using different chemicals and methods.
17. Effect to Heat Setting on Synthetic Materials.
18. To conduct practicals as per latest technology/material.

**Note**: The above experiment should be conducted and shall be decided on factors like:

1. Facilities installed at Institute
2. Accessibility to industry & nearby institute like IIT Delhi, NITRA Gaziabad, Textile Committee and NITRA Panipat.
3. Trend of technological developments in National & International perspective.

**MPC- 201N ENVIRONMENTAL STUDIES**

| L | T | P | Sessional | Exam | Time |
|---|---|---|---|---|---|
| 3 | - | - | 25 | 75 | 3H |

**UNIT I**

The multidisciplinary nature of environmental studies. Definition, Scope and Importance. Need for public awareness. Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

(a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

(b) Water Resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

(c) Mineral Resources- Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

(d) Food Resources- World Food Problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy Resources- Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

(f) Land Resources- Land as a resource, land, degradation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyle.

**UNIT II**

Ecosystem- Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem.

a. Forest Ecosystem
b. Grassland Ecosystem
c. Desert Ecosystem
d. Aquatic Ecosystems (ponds, streams, lakes, rivers, oceans, esturaries

Field Work: Visit to a local area to document Environment assets-river/forest/grassland/ hill/ mountain. Visit to a local polluted site- Urban /Rural/Industrial/Agricultural. Study of common plants, insects and birds. Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

**UNIT III**

Biodiversity and its conservation. Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spots of Biodiversity. Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts. Endangered and endemic species of India. Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

Environmental Pollution: Definition, Cause, effects and control measures of- (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards

Solid waste management- cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides

**UNIT IV**

Social Issues and the Environment, From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management.

Resettlement and rehabilitation of people: Its problems and concerns. Case Studies. Environmental ethics-issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies.

Wasteland Reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public Awareness, Human population and the Environment, Population growth, variation among nations. Population explosion-Family Welfare Programme, Environment and human health, Human rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human Health, Case Studies.

**Suggested Text Books & References:**

1. Environmental Studies- Deswal and Deswal. Dhanpat Rai & Co.
2. Environmental Science & Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India
3. Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
4. Environmental Science- Botkin and Keller. 2012. Wiley, India.