

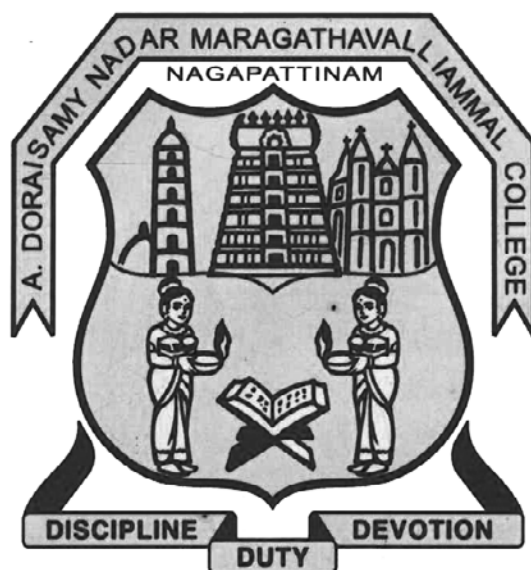
DEPARTMENT OF CHEMISTRY

U.G. PROGRAMME

SYLLABUS

2018 – 2021 BATCH

II SEMESTER



**A. D. M. COLLEGE FOR WOMEN
NAGAPATTINAM**

SEMESTER II
CORE COURSE – II

இடைக்கால இலக்கியமும் புதினமும்

அகமதிப்பீடு - 25
புறமதிப்பீடு - 75
மொத்த மதிப்பெண் - 100

பயிற்று மணிகள் - 6
தரப்புள்ளிகள் - 3
தேர்வு மணிகள் - 3

நோக்கம் :

1. சமய இலக்கியத் தோற்றத்திற்கான வரலாற்றுப் பின்புலத்தை அறிவித்தல்.
2. தமிழ் சைவ, வைணவ இலக்கியங்களை அறிமுகப்படுத்தல்.
3. தமிழ் மொழியின் செம்மொழிப் பண்புகளை அறியச் செய்தல்.
4. தமிழ்ச் சிற்றிலக்கியங்களின் இலக்கியச் சிறப்பைக் கற்பித்தல்.

அலகு - 1

பன்னிருதிருமுறைகள்

1. திருநாவுக்கரசர்தேவாரம் - திருப்பூந்துருத்தி (திருஅங்கமாலை)
2. சுந்தரர்தேவாரம் - திருவையாற்றுப் பதிகம்
3. மாணிக்கவாசகர் திருவாசகம் - சிவபுராணம்

அலகு - 2

நாலாயிரதிவ்வியப் பிரபந்தம்

1. பெரியாழ்வார் திருமொழி - நற்றாய் புலம்பல்
2. தொண்டரடிப்பொடியாழ்வார் - திருமாலை
3. மதுரகவியாழ்வார் - கண்ணிருண்சிறுத்தாம்பு

அலகு - 3

(அ) முத்துக்குமாரசாமி பிள்ளைத்தமிழ் : 2 பாடல்கள்

1. செங்கீரைப்பருவம் - பாடல் 8 - 'விரல்சுவை உண்டு'
2. அம்புலிப் பருவம் - பாடல் 6 - 'ஒழிகாதபுவனத்து'

(ஆ) நந்திக்கலம்பகம் : 2 பாடல்கள்

1. வாடைநோக
2. உரைவரம்பு
3. மயில்கண்டால்
4. சூழிவன்
5. கோலக்கொடி

(இ) தமிழ்விடுதாது

17 முதல் 46 வரை - 30 கண்ணிகள்

(ஈ) குற்றாலக் குறவஞ்சி: குறத்திமலைவளம் கூறல் - 3 பாடல்கள்

1. வானரங்கள்
2. முழங்கு
3. ஆடும் இரவு

(உ) கலிங்கத்துப் பரணி: களம் பாடியது - 4 பாடல்கள்

1. ஆடல்
2. நெருங்கு
3. வாய்மடித்து
4. தரைமகளும்

(ஊ) தனிப்பாடல்கள் : 5 பாடல்கள்

1. காளமேகப்புலவர் - 3 பாடல்கள்: 1. கத்துகடல் 2. பூநக்கி 3. பண்பு
2. ஓளவையார் - 1 பாடல் : மதியாதார்முற்றம்
3. பலபட்டடைச் சொக்கநாதப் புலவர் - 1 பாடல்: படிக்காகப் புலவர்பாடல்

அலகு - 4

புதினம் காயம். தி.வெ. இராசேந்திரன்

அலகு - 5 இலக்கிய வரலாறு

பன்னிருதிருமுறைகள், நாலாயிரதிவ்யபிரபந்தம், சிற்றிலக்கியங்கள்.

LEB

**A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM
DEPARTMENT OF ENGLISH
SEMESTER-II CATEGORY – PART II- ENGLISH
PAPER-II POETRY FOR EFFECTIVE COMMUNICATION
(For candidates admitted from the academic year 2016-17 onwards)**

SEMESTER II

ELC II – POETRY FOR EFFECTIVE COMMUNICATION

Objectives:

To make learners to be aware of the various elements of poetry.

To make them appreciate the poem.

Text prescribed:

I Tranquil Reflections

-Edited by Dr.A.Santhanalakshmi & Mrs.V.Kannaki, etal.

II Spoken Language Component

(Materials Prepared by the Department of English)

Unit – I

1. Christina Rossetti - “Goblin Market”
2. Edith Sitwell - "A Mother to her dead child”

Unit – II

3. Emily Dickens - “Hope”
4. Sylvia Plath - “Mirror”

Unit – III

5. Toru Dutt - “The Lotus”
6. Sarojini Naidu - “The Soul’s Prayer”

Unit – IV

7. Kamala Das - “ My Grandmother’s House”
8. Lakshmi Kannan - “She”

Unit – V

9. Meena Kandasamy -“Touch”

10. Meena Alexandar - "Muse"

11. Spoken Language Component- Syllable Division

Pattern of Evaluation

CIA – 25 Marks (Passing minimum of 40%)

Test (Written) – 10 Marks

Assignment & Group Discussion - 5 Marks

Written Quiz & Seminar - 5 Marks

Attendance - 5 Marks

SEMESTER – 75 Marks

Total Marks – 100 Marks (Passing minimum of 40%)

Question Pattern:

Section A - 20 Marks

Short answer questions (10x2=20 Marks)

Section B – 25 Marks

Paragraph Questions (5x4=20 Marks)

Answer all the Paragraph questions either or pattern (A question should be asked from each unit)

Spoken English Component 10 x ½ =5 Marks

Section C –

Essay Questions (3x10=30 Marks)

Answer any 3 Questions. (One Essay should be asked from each Unit)

UQBY

A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM
I.B.Sc., CHEMISTRY
(For candidates admitted from the year 2018 – 2021 Batch)

SEMESTER II
CORE COURSE II
VOLUMETRIC ANALYSIS - PRACTICAL

INT MARK : 40

EXT MARK: 60

Hours : 3

Credit : 3

Objectives:

1. To introduce the basic chemistry skills through qualitative analytical experiments
2. To learn the techniques of titrimetric analysis.
3. To know the estimation of several cations and anions.
4. To know the estimation of total hardness of water.

I Titrimetric Quantitative analysis

1. Estimation of HCl
2. Estimation of Na_2CO_3
3. Estimation of Oxalic acid
4. Estimation of Iron (II) Sulphate
5. Estimation of Ca (II)
6. Estimation of KMnO_4
7. Estimation of Fe (II) solution using internal and external indicators
8. Estimation of Cu (II) sulphate by $\text{K}_2\text{Cr}_2\text{O}_7$ solution
9. Estimation of Mg (II) by EDTA Solution
10. Estimation of Ca (II) by EDTA Solution
11. Estimation of Chloride (in neutral and acid media)

II-Applied Experiments

1. Estimation of Total hardness of water
2. Estimation of Saponification value of an oil

References:

1. V.Venkateshwaran,R.Veerawamy, A.R.Kulandaivelu Basic Principles of Practical Chemistry 2nd edition 1997
2. David T Plummer- An Introduction to practical biochemistry 3rd edition, Tata McGraw Hill Publishing company.
3. G.Svehla- Vogel's Quantitative Inorganic Analysis 7th edition Pearson education Ltd.
4. J.Mendham, R.C. Denney, J.D. Barnes & M.J.K.Thomas- Vogel's Textbook of quantitative chemical analysis 6th edition Pearson education Ltd.

Scheme of valuation	Max. Marks
Record	5
Procedure	10
Mark Distribution Bond:	
% of Error	
< 1%	45
1-2%	35
2-3 %	25
3-4%	15
>4%	10

A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM

I.B.Sc., CHEMISTRY

(For candidates admitted from the year 2018 – 2021 Batch)

SEMESTER II
CORE COURSE III
GENERAL CHEMISTRY II

INT MARK : 25

Hours : 6

EXT MARK: 75

Credit : 6

Objectives:

1. To learn the general characteristics of p-block elements.
2. To learn about the chemistry of alkyne and alkyl halides.
3. To Know about Liquid and Colloid state.

UNIT – I

(18 Hrs)

1.1. Alkyne-preparation , properties and uses, Acidity of alkynes, formation of acetylides, addition of water with HgSO_4 catalyst, addition of hydrogen halides and halogens, oxidation, ozonolysis and hydroboration.

1.2. Dienes - types of dienes – stability and chemical reactivity 1,2 and 1, 4 additions, kinetic and thermodynamic controls of a reaction. Diels-Alder reaction.

1.3. Alkyl Halides – Preparation-Properties, Vicinal and gem dihalides , Grignard reagent – preparation and synthetic applications.

UNIT – II

(18 Hrs)

2.1. Group III A elements - Comparative study of boron family elements ,Compounds of boron – borax, borazole, boron trioxide, orthoboric acid, boron halides , borazine and diborane. Compounds of Aluminium – Aluminium Oxide, Aluminium Chloride, Sulphates , Alum.

2.2. Group IVA elements - Comparative study of carbon family elements. Chemistry of Cyanogens, Hydrocyanic acid, Cyanic Acid, Thiocyanic acid, Ammonium Thiocyanate and Carbon Disulphide. Properties, structures & uses of Graphite, Diamond and Fullerenes. Preparation, properties , structure and uses of silicon ,silicon dioxide, silicic acid, silicon tetra chloride & hydrofluorosilicic acid.

UNIT –III

(18 Hrs)

3.1. Group VA Elements- Unique features of Nitrogen- physical and chemical properties of Nitrogen –Hydrazine, Hydroxyl amine, Hydrazoic acid and Nitric acid, Phosphatic Chemistry of $\text{PH}_3, \text{PCl}_3, \text{PCl}_5, \text{POCl}_3, \text{P}_2\text{O}_5$ and Oxyacids of phosphorous .

3.2. Group VIA Elements- Group study – classification of oxides - Preparation, properties & structure of sulphur acids $\text{H}_2\text{SO}_3, \text{H}_2\text{SO}_4, \text{H}_2\text{SO}_5, \text{H}_2\text{S}_2\text{O}_8$, Thionic acids – and sulphur oxides, hydrides, halides, oxides of Selenium and Tellurium.

UNIT –IV

(18 Hrs)

4.1. Liquid State: Properties of liquids, vapour pressure, measurement of vapour pressure, heat of vaporization, Trouton's rule, surface tension, measurement of surface tension and vapour pressure, variation of surface tension with temperature.

4.2. Viscosity- Determination of viscosity, variation of viscosity with temperature and pressure, liquid crystals, definition of liquid crystals, classification, theory of liquid crystals, molecular viscosity.

1.3. Physical properties and chemical constitution – additive and constitution property, molar volume and chemical constitution – Kopp's law, the parachor and chemical constitution –Parachor, atomic parachor, structural parachor and application of parachor in deciding structures.

UNIT –V

(18 Hrs)

5.1. Colloids – types of colloidal system – true solution – colloidal solution and suspension – property of colloidal system – optical property – Brownian movement, electrical properties – Electrophoresis – Electro Osmosis of colloids – Gold number – Theories of protection – Stabilities of sols.

5.2. Gel and Emulsion – Preparation, Properties and Uses.

TEXT BOOKS

1. B.S. Bahl and Arun Bahl, “ Advanced Organic Chemistry , (12th edition) New Delhi, Sultan Chand and Co., (1997)
2. B.R Puri ,L.R.Sharma and M.S.Pathania , “ Principles of Physical Chemistry ,”
3. B.R.Puri,L.R. Sharma ,K.K. Kalia principles of Inorganic chemistry.35th edition , New edition: Shoban Lal Nagin chand and co. 2013.

REFERENCES:

1. J.D.Lee , “ Concise Inorganic Chemistry”, 20th revised edition, Sultan Chand and Sons, 2000.
2. R. T Morrison and R.N.Boyd , “ Organic Chemistry” (6th edition) New york, Allyn & Bacon Ltd., (2006).
3. Gilbert W.Castellan “Physical chemistry” (3rd edition),Narosa publishing House, New Delhi (2004)
4. J.E.Huheey., E.A.Keiter.,R.L.Keiter and O.K.Medhi., *Inorganic Chemistry - Principles of Structure and Reactivity*, 4th edition, Pearson Education, **2006**.
5. A.G.Sharpe, *Inorganic Chemistry*, 3rd edition, Pearson, **2010**

UZA2Y

A.D.M.COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM

SEMESTER II

ALLIED COURSE II – ZOOLOGY II

(BIOLOGY OF INVERTEBRATES & CHORDATES AND ENTREPRENEURIAL ZOOLOGY)

ALLIED ZOOLOGY (I B.SC., CHEMISTRY)

Int: 25

Ext:75

Inst.hrs: 3

Credit: 3

I DISSECTION

1. Earth worm- Digestive system and Nervous system
2. Lamellidens- Alimentary canal
3. Fish – Digestive system

II MOUNTING

1. Earth worm - Body setae and Pineal setae
2. Mouthparts - Cockroach, Honey Bee and Mosquito
3. Shark - Placoid scales

III SPOTTER

Invertebrata

Paramecium caudatum – Entire, Paramecium – Conjugation, Obelia geniculata - Entire
Taenia solium – Entire, Scolex, Neries, Pila, Star fish

Chordata

1. Shark, Exocoetus, Hyla, Bufo, Calotes, Cobra, Pigeon, Bat, Rabbit

Entrepreneurship Zoology

1. Earth Worm, Apis indica, Lac insect, Bombyx mori, Catla, Rohu, Common Carp
.Penaeus monodon, Pearl oyster (Pinctada vulgaris), Hen

Products of Animal

Vermicompost, Honey, Lac, Fish liver oil, Silk, Pearl, Hen egg

A record of lab work should be maintained and submitted at the time of practical examination for valuation.

UZA3

A.D.M.COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM

SEMESTER II

ALLIED COURSE III – ZOOLOGY III

ENTREPRENEURIAL ZOOLOGY

ALLIED ZOOLOGY (I B.SC., CHEMISTRY)

Int: 25

Inst hrs: 4

Ext: 75

Credit : 4

Objectives:

To bring about an awareness to the various branch of Zoology available to get the self employment opportunity .To generate employments, To motivate to become entrepreneurs.

Unit-I

12 Hours

Vermiculture-Types : Eugenia, Endrilles and Perionyx excavates Biology of Earthworm – Vermicomposting - Required Conditions – Methods (pit and heap) – Advantages – Economic importance of vermiculture

Unit-II

12 Hours

Apiculture – Species of Honey Bee, Types of Honey bee – Newton’s Bee hive – Care and Management – Honey extraction and Honey extracting equipments (Honey extractor, Smoker, Queen excluder, Drone excluder, Bee veil. – Nutritive and Medicinal value of Honey, Advantages –Economic impotance of Apiculture

Unit – III

12 Hours

Lac Culture – Life cycle of Lac insect - Economic importance of Lac.

Sericulture: Life cycle of Bombyx mori – Economic importance of silk.

Unit – IV

12 Hours

Aquaculture – Construction and Management of Pond. Culture practices of Common Carp. Shrimp Culture – Penaeus mondon- Pearl culture

Unit – V

12 Hours

Poultry farming – Types of Poultry – Care and Management – Poultry nutrition – Diseases and their management – Composition and Nutritive value of egg- Economics of Poultry production.

REFERENCE:

1. **PILLAI, T.V.R.**, 1988. Aquaculture: Principle and practices. Fishing news books.
2. **RAMASAMY,P.**, 1992. Diseases of Shrimps in aquaculture systems, Vanitha publication
3. **SANTHANAM, R.**, 1987. Fisheries Science, Daya publishing house.
4. **ARUMUGAM, N.** Aquaculture Saras Publications.
5. **SHUKLA, G.S.** and **UPADHYAY V.B.** (1997) Economics Zoology, Rastogi publications, Meerut.
6. **MORSE, R.A.** 1990. The ABC and XYZ of Bee Culture 40th Edition A.I. Root & Co., Ohio.
7. **MANJUYADAV.,**(2003).Economic Zoology ,Discovery Publishing House. New Delhi

A.D.M. College for Woman (Autonomous), Nagapattinam
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POST GRADUATE & RESEARCH DEPARTMENT OF MATHEMATICS
B.Sc Mathematics (for those admitted from 2016 – 2017 onwards)
CHOICE BASED CREDIT SYSTEM
SEMESTER II

ALLIED COURSE II- MATHEMATICS II

CALCULUS AND VECTOR CALCULUS
(For Physics , Chemistry and Geology Major)

Internal : 25
External : 75
code:UMA2

Instruction Hours : 6
Exam Hours : 3 Subject
Credit: 4

Unit I

Differentiation: The n^{th} derivative of standard functions - Leibnitz's Theorem for n^{th} derivative of a product of functions (Statement Only) – Simple Problems. (18 Hours)

Unit II

Curvature – Radius of curvature in Cartesian only - Total Differential Coefficients - Jacobians of two and three variables– Simple Problems. (18 Hours)

Unit III

Bernoulli's formula – Reduction formula for the integrals $\int \sin^m x \cos^n x \, dx$, $\int x^m (\log x)^n \, dx$ (m, n is a positive integers), $\int e^{ax} \cos bx \, dx$ and $\int e^{ax} \sin bx \, dx$ – Simple Problems. (18 Hours)

Unit IV

Integration: Double integrals – Surface area - Changing the order of Integration – Triple Integrals. (18 Hours)

Unit V

Vector Differentiation: Gradient – Unit vector normal to the surface – Directional derivatives - Divergence, Curl – Solenoidal and Irrotational - Laplacian operator– Simple Problems. (18 Hours)

Text Books:

1. For units I and II - "Calculus Vol I" by T.K. Manickavasagam Pillai and S. Narayanan , S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
2. For unit III and IV - "Calculus Vol II" by T.K. Manickavasagam Pillai and S. Narayanan , S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.
3. For unit V- Vector Algebra and Analysis" by T.K. Manickavasagam Pillai and S.Narayanan , S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.

Reference Books:

1. Calculus – S. Arumugam.

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POST GRADUATE & RESEARCH DEPARTMENT OF MATHEMATICS
B.Sc., Mathematics (for those admitted from 2017 onwards)
CHOICE BASED CREDIT SYSTEM
ALLIED MATHEMATICS III

SEMESTER II
ALLIED COURSE III - MATHEMATICS III
DIFFERENTIAL EQUATIONS AND TRANSFORMS

(For Physics , Chemistry and Geology Major)

Internal : 25

External : 75

Subject Code: UMA3

Instruction Hours : 4

Exam Hours : 3

Credit : 3

Unit 1

Linear equations with constant coefficients Evaluation of particular integral of x^k where k is a positive integer and $e^{ax} f(x)$, where $f(x)$ is any function of x – second order linear equations with variable coefficients– Simple Problems. (12 Hours)

Unit 2

Partial differential Equations – Formation of equations by elimination of constants and arbitrary functions – Definition of General, Particular, Complete and singular integral (Geometrical meaning not expected) – Lagrange's method of solving the linear equations ($Pp + Qq = R$) – Simple Problems. (12 Hours)

Unit 3

Solutions of first order equations of the standard forms $F(p,q) = 0$, $F(x,p,q) = 0$, $F(y,p,q) = 0$, $F(z,p,q) = 0$, $F(x,p) = F(y,q)$, - Clairaut's form- Simple Problems. (12 Hours)

Unit 4

Definition – Laplace transform of functions e^{at} , $\cos at$, $\sin at$, t^n where n is a positive integer – Shifting theorems – Laplace transform of $e^{-at} f(t)$ – Laplace transform of $e^{-at} \cos bt$, $e^{-at} \sin bt$ and $e^{-at} f(t)$ – Laplace transform of $f'(t)$ and $f''(t)$ – Simple Problems. (12 Hours)

Unit 5

Inverse transform of standard forms – Application to the solution of ordinary differential equations with constant coefficients involving the above transformations – Simple Problems. (12 Hours)

Text Book:

“Differential Equations” by T.K. Manickavasagam Pillai and S. Narayanan, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai.

Reference Books:

1. Differential equations - M.L.Khanna
2. Engineering Mathematics (Volume II) – M.K.Venkatraman

II SEMESTER ENVIRONMENTAL STUDIES

Internal Marks: 25

Instruction Hrs : 2

External Marks: 75

Credit : 2

Total Marks : 100

Exam Hrs : 3

Unit: 1 The Multidisciplinary nature of environmental studies Definition, scope and importance.

Need for public awareness.

(2 Hours)

Unit: 2 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 resources, land degradation, man induced Landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

(8 Hours)

Unit: 3 Ecosystems

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, estuaries)

Unit: 4 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 at global, National and local levels India as a mega-diversity nation Hot-spots of biodiversity

Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.

Endangered and endemic species of India Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

(8 Hours)

Unit: 5 Environmental Pollution

Definition Causes, 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: Causes, 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. III-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety

(8 Hours)

Unit: 6 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.

(7 Hours)

Unit: 7 Human Population and the Environment

Population growth, variation among nations.

Population explosion – Family Welfare Programmes

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.

Unit: 8 Field Work

Visit to a local area to document environmental assets-river / forest/ grassland/ hill / Mountain.

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad – 380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
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