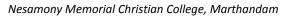MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12
SYLLABUS
UG - COURSES – AFFILIATED COLLEGES
Course Structure for B. Sc. Physics
(Choice Based Credit System)

(with effect from the academic year 2024-2025 onwards)

Semester-III
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
I	LANGUAGE	TAMIL/MALAYALAM/HINDI		3
II	ENGLISH	ENGLISH		3
III	CORE	MECHANICS		4
III	CORE	PHYSICS PRACTICAL III		2
III	ELECTIVE	ALLIED CHEMISTRY I		4
		ALLIED CHEMISTRY PRACTICAL I		2
IV	SEC	MAINTENANCE OF ELECTRICAL APPLIANCES		2
IV	EVS	ENVIRONMENTAL STUDIES		2
		NAAN MUTHALVAN (Instrumentation Physics I)		2

Total Marks: 100   Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
 3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks   Total - 25 marks

B. **Scheme of External Examination**
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

➢ **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

➢ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma\,(GP \times C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➢ **Classification**
a) First Class with Distinction   : CGPA ≥ 7.5*
b) First Class   : CGPA ≥ 6.0
c) Second Class   : CGPA ≥ 5.0 and < 6.0
d) Third Class   :   CGPA< 5.0

Nesamony Memorial Christian College, Marthandam

<div align="center">

Part I TAMIL
தமிழக வரலாறும் பண்பாடும்

</div>

அலகு 1

தொல் பழங்கால வரலாறும் சங்ககால வரலாறும்

1. தொல் தமிழர்
2. பழைய கற்காலம்
3. புதிய கற்காலம்
4. உலோகக் காலம்
5. அகழ்வாராய்ச்சியில் தமிழும் தமிழரும் (கீழடி வரை)
6. திணை வாழ்வியல் (களவு வாழ்க்கை, கற்பு வாழ்க்கை, உணவு, அணிகலன்கள், வாணிகம், விளையாட்டுகள்)
7. கல்வியும் கலைகளும்
8. தமிழ் வளர்த்த சங்கம்
9. சங்க கால ஆட்சி முறை
10. அயல்நாட்டுத் தொடர்புகள்

அலகு 2

ஆட்சியர் வரலாறு

1. மூவேந்தர் வரலாறு
2. பல்லவர் வரலாறு
3. நாயக்கர் ஆட்சி
4. முகம்மதியர் ஆட்சி
5. மராட்டியர் ஆட்சி

அலகு 3

ஐரோப்பியர் கால வரலாறு

1. போர்த்துகீசியர்
2. டச்சுக்காரர்கள்
3. டேனிஸ்காரர்கள்
4. பிரெஞ்சுக்காரர்கள்
5. ஆங்கிலேயர்கள்
6. பாளையக்காரர்கள்
7. இந்தியா விடுதலை போராட்டத்தில் தமிழ்நாடு

அலகு 4

விடுதலைக்குபின் தமிழ்நாட்டு வரலாறு

1. மொழிப்போராட்டம்
2. சமூக மறுமலர்ச்சி
3. தொழில்நுட்ப வளர்ச்சி

அலகு 5

மொழிப்பயிற்சி

- நிறுத்தக் குறிகள்
- கலைச்சொற்கள்
- மொழிபெயர்ப்பு

Text Books

1. தமிழக வரலாறும் பண்பாடும் - கே. கே. பிள்ளை, உலகத் தமிழாராய்ச்சி நிறுவனம் , சென்னை
2. தமிழர் நாகரீகம் பண்பாடும் - அ.தட்சிணாமூர்த்தி, யாழ் வெளியீடு, சென்னை
3. தமிழக வரலாறும் பண்பாடும்-வே.தி.செல்லம், மணிவாசகர் பதிப்பகம், சென்னை

Reference Books

1. தமிழக சமுதாய பண்பாட்டு கலை வரலாறு - கு சேதுராமன் , என்,சி,பி,எச், சென்னை
2. தமிழர் கலையும் பண்பாடும்-அ .கா.பெருமாள், என்,சி,பி,எச், சென்னை
3. ஒரு பண்பாட்டின் பயணம்: சிந்து முதல் வைகை வரை - ஆர். பாலகிருஷ்ணன், ரோஜா முத்தைய ஆராய்ச்சி நூலகம், சென்னை

MALAYALAM - POETRY

UNIT I

This unit focus on significance of Malayalam Poetry and trends.

To familiarize the early stages of Malayalam poetry- Folklore heritage-Pattu-Bhakthi movement-Cherussery-Ezhutachan- Kunjan Nambiar-

Detailed study:

Jaritha Vilapam (Mahabharatam kilippattu) Ezhutachan

UNIT II

Romanticism –Asan- Ulloor – Vallathol

Detailed study:

1. Veena Poovu (First 7 slokas only)- Asan
2. Aa poomala- Changampuzha

UNIT III

Modernity in Malayalam poetry- First phase

Post Independent India and Modernization of Nation in Malayalam poetry

Detailed study

1. Yuga Parivarthanam- Vailoppilli Sreedhara Menon
2. Gandhiyum Godseyum- N .V.Krishna Warrier

UNIT IV

Modernity in Malayalam poetry- second phase

Detailed Study

1. Gajendra moksham _ Sugathakumari
2. Kozhi – Kadammanitta
3. Megharoopan – Aattoor Ravi Varma
4. Budhanum Attin kuttiyum – A. Ayyappan

UNIT V

This unit introduces the nature of samakalika kavitha It also evaluates s a m a k a l i k a kavitha,- the contemporary poetry originated after modern poetry- women, Dalit, environment and cyber issues.

Detailed study

1.Pattanbipuzhamanalil – P P Ramachandran
2.Malayalakavithakku oru Kathu- S. Joseph
3.Thoramazha – Rafeek Ahammad
4.Muttamadikkumbol – Anitha Thampi
5.Survey of India-B.M.Manoj

Recommended Text

Puthukavitha Ed by Dr.O.K.Santhosh.Madras University Publication (5 poems only)

(a) pattambipuzhamanalil,
(b) Malayala kavithakku oru kathu,
(c) Muttamadikkumbol,
(d) Thoramazha,
(e) Survey of India

Reading List (Print and Online)

1. Aadhunika Malayala Sahithya Charithram prasthanangaliloode – Dr. K.M.George (Ed.)
2. Kairaliyute Kadha – N.Krishnapillai
3. Kavitha Sahitya Charithram – M.Leelavathi
4. Adrushyathayute Akhyanangal- Rajesh Chirapadu
5. Adhunikananthara Malayala Kavitha –C.R.Prasad
6. Pen kavitha malayalathil-Sheeba Divakaran,kerala bhasha institute.Thiruvananthapuram
7. Samakalika Malayala kavitha-M.B.Manoj,Samayam Classics. Kannoor
8. Varnnaraji Dr.M.Leelavathi

Nesamony Memorial Christian College, Marthandam

HINDI - Patra Lekhan aur Paribhashik Shabdavali

Unit I

Niji Patra Lekhan

- Niji Patra – Arth aur Bhed
- Pitaji/Mataji ke naam patra
- Mitra, Bhai aadi ke naam patra
- Paribhashik Shabdawali – 20 words

Unit II

Samajik Patra Lekhan

- Samajik Patra – Arth aur Bhed
- Aavedan Patra – Noukri, Chutti aadi
- Dak Adhikari ke naam patra
- Paribhashik shabdawali – 20 words

Unit III

Vyavasayik Patra Lekhan

- Vyavasayik Patra – Arth aur Bhed
- Prakashak ke naam patra
- Shikayathi
- Paribhashik shabdavali – 20 words

Unit IV

- Samanya Parichay
- Sarkari Patra
- Ardh-Sarkari Patra
- Gyapan, Paripatra
- Anusmarak
- Paribhashik Shabdavali – 20 words

Unit V

- Precis Writing And Applied Grammar (Ling, Vachan and Karak)

Reference Books

1. Viyavaharik Hindi, Hindi Prachar press, T.Nagar, Madras-600 017
2. Alekhan aur Tippan – Prof. Viraj
3. Alekhan - Kichlu

Related Online Contents (MOOCs, SWAYAM, NPTEL, YouTube, Websites, etc.)

1. https://youtu.be/-kUPGG0B4tU
2. https://www.youtube.com/watch?v=xk14MNb1r7k

GENERAL ENGLISH

Unit I ACTIVE LISTENING
Short Story
      1.1 In a Grove – Akutagawa Ryunosuke Translated from Japanese by Takashi Kojima
      1.2 The Gift of the Magi – O' Henry
Prose
      1.3 Listening – Robin Sharma
      1.4 Nobel Prize Acceptance Speech – Wangari Maathai

Unit II INTERPERSONAL RELATIONSHIPS
Prose
      2.1 Telephone Conversation – Wole Soyinka
      2.2 Of Friendship – Francis Bacon
Song on (Motivational/ Narrative)
      2.3 Ulysses – Alfred Lord Tennyson
      2.4 And Still I Rise – Maya Angelou

Unit III COPING WITH STRESS
Poem
      3.1 Leisure – W.H. Davies
      3.2 Anxiety Monster – Rhona Mc Ferran
Readers Theatre
      3.3 The Forty Fortunes: A Tale of Iran
      3.4 Where there is a Will – Mahesh Dattani

Unit IV Grammar
      4.1 Phrasal Verbs & Idioms
      4.2 Modals and Auxiliaries
      4.3 Verb Phrases – Gerund, Participle, Infinitive

Unit V Composition/ Writing Skills
      5.1 Official Correspondence – Leave Letter, Letter of Application, Permission Letter
      5.2 Drafting Invitations
      5.3 Brochures for Programmes and Events

Text Books (Latest Editions)
1. Wangari Maathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Jul 2023.
2. Mahesh Dattani, Where there is a Will. Penguin, 2013.
3. Martin Hewings, Advanced English Grammar, Cambridge University Press, 2000
4. Essential English Grammar by Raymond Murphy

Web Resources
1. WangariMaathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Mon. 17 Jul 2023. https://www.nobelprize.org/prizes/peace/2004/maathai/lecture/
2. Telephone Conversation - Wole Soyinka https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html
3. Anxiety Monster-RhonaMcFerran www.poetrysoup.com

Nesamony Memorial Christian College, Marthandam

MECHANICS

COURSE OBJECTIVES

This course allows the students:

- To have a basic understanding of the laws and principles of mechanics;
- To apply the concepts of forces existing in the system;
- To understand the forces of physics in everyday life;
- To visualize conservation laws;
- To apply Lagrangian equation to solve complex problems.

UNIT-I

LAWS OF MOTION:

Newton's Laws – forces – equations of motion – frictional force – motion of a particle in a uniform gravitational field.

Gravitation: Introduction – Kepler's laws, Newton's law of gravitation -Determination of G by Boy's method – Earth-moon system – weightlessness – earth satellites –earth density – mass of the Sun – gravitational potential –escape velocity – satellite potential and kinetic energy

UNIT-II

CONSERVATION LAWS OF LINEAR AND ANGULAR MOMENTUM:

Conservation of linear and angular momentum – Internal forces and momentum conservation – center of mass – examples – general elastic collision of particles of different masses – system with variable mass – examples – conservation of angular momentum – torque due to internal forces – torque due to gravity – angular momentum about center of mass

UNIT-III

CONSERVATION LAWS OF ENERGY:

Introduction – significance of conservation laws – law of conservation of energy - concepts of work- power – energy – conservative forces – potential energy and conservation of energy in gravitational field – examples –non-conservative forces – general law of conservation of energy.

UNIT-IV

RIGID BODY DYNAMICS:

Translational and rotational motion – angular momentum – moment of inertia – general theorems of moment of inertia – examples – rotation about fixed axis – kinetic energy of rotation – examples – body rolling along a plane surface – body rolling down an inclined plane

UNIT-V

LAGRANGIAN MECHANICS:

Generalized coordinates –degrees of freedom - principle of virtual work and D'Alembert's Principle – Lagrange's equation from D'Alembert's principle – application –simple pendulum – Atwood's Machine.

TEXT BOOKS
1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai.
2. P.Durai Pandian, Laxmi Durai Pandian, Muthamizh Jayapragasam, 2005, Mechanics, 6th revised edition, S.Chand and Co.
3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition, S.Chand and Co.
4. Narayanamurthi, M. and Nagarathnam. N, 1998, Dynamics. The National Publishing, Chennai.
5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai.

REFERENCE BOOKS
1. Goldstein Herbert, 1980, Classical Mechanics. U.S.A: Addison and Wesely.
2. Halliday, David and Robert, Resnick, 1995, Physics Vol.I. New Age, International, Chennai.
3. Halliday, David Robert Resnick and Walker Jearl, 2001, Fundamentals of Physics, John Wiley, New Delhi

WEB RESOURCES
1. https://youtu.be/X4_K-XLUIB4
2. https://nptel.ac.in/courses/115103115
3. https://www.youtube.com/watch?v=p075LPq3Eas
4. https://www.youtube.com/watch?v=mH_pS6fruyg
5. https://**onlinecourses**.nptel.ac.in/noc22_me96/preview
6. https://www.youtube.com/watch?v=tdkFc88Fw-M
7. https://onlinecourses.nptel.ac.in/noc21_me70/preview

PHYSICS PRACTICAL III

COURSE OBJECTIVES
- Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept.

Minimum of Six Experiments from the list:
1. Calibration of low range voltmeter using potentiometer
2. Calibration of ammeter using potentiometer.
3. Determination of field along the axis of a current carrying circular coil.
4. Determination of earth's magnetic field using field along axis of current carrying coil.
5. Determination of specific resistance of the material of the wire usingPO box.
6. Determination of specific resistance using Carey Foster's bridge.
7. Determination of e.m.f of thermo couple using potentiometer
8. Determination of figure of merit of BG or spot galvanometer.
9. Ballistic Galvanometer – Comparison of EMF's – E1 / E2
10. Series Resonance Circuit
11. Parallel Resonance Circuit

12. Owen's Bridge – Determination of self-inductance of the coil
13. Anderson's bridge – Self - inductance of the coil
14. Comparison of Magnetic Moments – Deflection Magnetometer (Tan A and Tan B position)
15. M and BH – Vibration magnetometer

Note: Use of digital balance, digital screw gauge, digital calipers are permitted

MAINTANANCE OF ELECTRICAL APPLIANCES

COURSE OBJECTIVES
- This course enables the students to understand the operations and safety handling of certain commonly used domestic appliances. The paper needs a basic knowledge in electricity and magnetism and the learners are expected to gain knowledge to design and trouble shoot electrical circuits.

UNIT-I
Basic Electric components Active & passive components-Resistance – capacitance types - inductance –its units- - Galvanometer, ammeter, voltmeter and multimeter-Transformers-types-coils –wire gauges-Electrical energy - power - consumption of electrical power.

UNIT-II
Basic home Electrical appliances Electric bulbs-working principles of -LED lamps-Electric Fans-Wet Grinder- Water purifier basics and working – maintenance-Mixie – electric Iron box

UNIT-III
High Power Electrical appliances and safety requirements Water Heater - Storage and Instant types – basics and working of microwave oven - Washing Machine - Air conditioner- its maintenance- concept of water pumping motor - overloading-short circuiting- ground earthing of appliances.

UNIT-IV
Thermal electrical appliances Room heater-basics and working of-electric iron & immersion rod-automatic rice cooker electric kettle-toaster& hair dryer-induction cooker& stove

UNIT-V
Relays & Switches Electrical protection - Relays - Fuses - Electrical switches - Circuit breakers-MCB - basics and working of ELCB - RCCB - ground fault protection

TEXT BOOKS
1. J.C.Upadhyaya, 2019, Classical Mechanics, Himalaya Publishing house, Mumbai.

2. P.DuraiPandian, Laxmi Durai Pandian, Muthamizh Jayapragasam, 2005, Mechanics, 6th revised edition, S.Chand and Co.
3. D. S.Mathur and P. S.Hemne, 2000, Mechanics, Revised Edition, S.Chand and Co.
4. Narayanamurthi, M. and Nagarathnam. N, 1998, Dynamics. The National Publishing, Chennai.
5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics, Hydrostatics and Hydrodynamics, The National Publishers, Chennai.

REFERENCE BOOKS

1. A text book in Electrical Technology - B L Theraja - S Chand &Co.
2. A text book of Electrical Technology - A K Theraja
3. Performance and design of AC machines - M G Say ELBS Edn.
4. Semiconductor Physics and Opto Electronics by P K Palanichamy
5. Basic Electronics - B L Theraja - S Chand &Co.
6. Principles of Communication Engineering - Arokh Singh and A K Chhabra – S Chand & Co.

ALLIED CHEMISTRY FOR PHYSICAL SCIENCES I
(FOR MATHEMATICS & PHYSICS STUDENTS)

Objectives

This course aims to provide knowledge on the
- Basics of atomic orbitals, chemical bonds, hybridization
- Concepts of thermodynamics and its applications.
- Concepts of nuclear chemistry
- Importance of chemical industries
- Qualitative and analytical methods.

UNIT I Chemical Bonding and Nuclear Chemistry

Molecular Orbital Theory- bonding, antibonding, and non-bonding orbitals. Molecular orbital diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties. Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers-Differences between chemical reactions and nuclear reactions-group displacement law. Nuclear binding energy- mass defect-calculations. Nuclear fission and nuclear fusion- differences–Stellar energy. Applications of radioisotopes - carbon dating, rockdating and medicinal applications.

Unit II Industrial Chemistry

Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG and oil gas (manufacturing details not required).
Silicones: Synthesis, properties and uses of silicones.
Fertilizers: Urea, ammonium sulphate, potassium nitrate, NPK fertilizer, superphosphate, triple superphosphate.

UNIT III Fundamental Concepts in Organic Chemistry

Hybridization: Orbital overlap, hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Electronic effects: Inductive effect and consequences on Ka and Kb of organic acids and bases, electromeric, mesomeric, hyperconjugation and steric-examples. Reaction mechanisms:

Types of reactions–aromaticity (Huckel'srule)- aromatic electrophilic substitution; nitration, halogenation, Friedel-Craft' salkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.

UNIT IV Thermodynamics and Phase Equilibria

Thermodynamics: Types of systems, reversible and irreversible processes, isothermal and adiabatic processes and spontaneous processes. Statements of first law and second law of thermodynamics. Carnot's cycle and efficiency of heat engine. Entropy and its significance. Free energy change and its importance (no derivation). Conditions for spontaneity in terms of entropy and Gibbs free energy. Relationship between Gibbs free energy and entropy.

Phase Equilibria: Phase rule-definition of terms in it. Applications of phase rule to Water system. Two component system-Reduced phase rule and its application to a simple eutectic system (Pb-Ag).

UNIT V Analytical Chemistry

Introduction to qualitative and quantitative analysis. Principles of volumetric analysis. Separation and Purification techniques–extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography.

Recommended Text

1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition, 2009.
2. S.Vaithyanathan, Textbook of Ancillary Chemistry; Priya Publications, Karur, 2006.
3. S.Arun Bahl, B.S. Bahl, Advanced Organic Chemistry; S. Chandand Company, NewDelhi, twenty third edition, 2012.
4. P.L.Soni, H. M. Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.

ALLIED CHEMISTRY PRACTICAL FOR PHYSICAL SCIENCES I
(For Mathematics and Physics – I Year /I Semester)

Objectives

This course aims to provide knowledge on the

- Basics of preparation of solutions.
- Principles and practical experience of volumetric analysis

Course Outline

VOLUMETRIC ANALYSIS

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid using standard oxalic acid.

3. Estimation of ferrous sulphate using standard Mohr's salt.
4. Estimation of oxalic acid using standard ferrous sulphate.
5. Estimation of potassium permanganate using standard sodium hydroxide.
6. Estimation of magnesium using EDTA.
7. Estimation of ferrous ion using diphenylamine as indicator.

Reference Books

1. V.Venkateswaran,R.Veerasamy,A.R.Kulandaivelu,BasicPrinciplesofPractical Chemistry;SultanChand&sons,Secondedition,1997.

INSTRUMENTATION PHYSICS - I

COURSE OBJECTIVES

- This course provides an understanding of basic electronic instrumentation and measurements techniques. The paper needs a basic knowledge in basic physics and technology

.
UNIT-I
MEASUREMENT
Definition - Units of measurement; systems of units - Length, mass, and time measurements - Accuracy and precision

UNIT-II
ERROR
Definition - Types of error (Gross error, Systematic error, Random error) - Statistical analysis (Arithmetic mean, Deviation from the mean, Average deviation, Standard deviation) - Probability of errors (Normal distribution of errors, Probable error) - Limiting errors.

UNIT-III
ELECTRODES
Electrode potential - Purpose of the electrode paste - Electrode material - Types of electrodes - Microelectrodes (metal microelectrode) - Surface electrodes

UNIT-IV
SPECIALIZED IN MEDICAL INSTRUMENTS
Angiography - Digital thermometer - Endoscopes - EEG - ECG – Computed Tomography (CT scan)

UNIT-V
DISPLAYS
Classification of displays - Display devices - Liquid Crystal Diode – Incandescent display -Liquid vapour display – Light Emitting Diode (LED)

TEXT BOOKS

1. Albert D. Helfrick and William D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice-Hall of India Pvt. Limited, Reprint 2002.

2. M. Arumugam, Biomedical Instrumentation, Anuradha Agencies, Reprint 2002.
3. H.S.Kalsi, Electronic Instrumentation, Tata McGraw Hill Education Pvt. Limited, Reprint 2012.

REFERENCE BOOKS
1. P.Mani, A text book of Engineering Physics-I, Dhanam Publications, Reprint 2013.
2. G.Jose Robin and A. Ubald Raj, Applied Physics, Indira Publications, Marthandam, 1998

ENVIRONMENTAL STUDIES

Course Objectives:
The main objectives of this course are:
- Enable the students to be aware of our natural resources, ecosystems and their linkages to society, livelihood, environment and conservation.

Unit I
Multidisciplinary Nature of Environmental Studies and Natural Resources:
Concept of Renewable and non-renewable resource, Natural resources and associated problems: Forest resources: Deforestation, Timber extraction, mining, dams and their effects. Water resources: Over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Land resources: Land degradation, man induced landslides, soil erosion and desertification.

UNIT II
Ecosystem: Concept of an Ecosystem, Structure and Functions of Ecosystem, Energy flow in the Ecosystem; Ecological Succession, Food Chains, Food webs and Ecological Pyramids, Characteristic Features of the following Ecosystem: Forest Ecosystem, Grassland Ecosystem and Desert Ecosystem, Aquatic Ecosystem (Ponds, Streams, Lakes, Rivers and Ocean Estuaries)

UNIT III
Biodiversity and its Conservation: Definition, levels and values of biodiversity; Threats to biodiversity- habitat loss, poaching of wildlife, man-wildlife conflicts, IUCN categories of threat; Terrestrial and marine hotspots of biodiversity in India; Conservation of Biodiversity - In-situ and Ex-situ conservation; Conservation schemes :Gir lion sanctuary project, Project tiger, Project elephant, Conservation of sea turtles in India. Ecotourism

UNIT IV
Environment Pollution: Types, causes, effects, and control - Air, Water, Soil and Noise pollution. Nuclear hazards and human health risks. Solid waste management: Control measure of urban and industrial waste. Climate change global warming, ozone layer depletion, acid rain, and impacts on human communities and agriculture

UNIT V
Social Issues and the Environment: Sustainable Development, Water Conservation, Resettlement and rehabilitation of people. Disaster Management: Floods, earthquake, cyclone and landslides. Consumerism and waste products; Environment Protection Act; Air and water (Prevention and control of Pollution) Act; Wild life protection Act; Forest conservation Act; Environmental movements (Chipko, Silent valley, Bishnois of Rajasthan). Environmental ethics. Environmental communication and public awareness.

Reading list
1. Erach Bharucha, 2021, Textbook of Environmental Studies for Undergraduate Courses, Third Edition, Orient blackswan Pvt. Ltd., Hyderabad.
2. V.K. Ahluwalia, Environmental Studies (Second Edition), Ane books India, T-Nagar, Chennai.
3. Y.K. Singh, 2006, Environmental science, New Age International (P) Ltd., Publishers, New Delhi.
4. S. P. Misra, 2023, Essential Environmental Studies, 4th Edn, Ane Books Pvt. Ltd., New Delhi.
5. G.S. Vijayalakshmi, A.G.Murugesan and N.Sukumaran, 2006, Basics of Environmental Science, Manonmaniam Sundaranar University Publications, Tirunelveli.

Recommended texts
1. N.Arumugam and V. Kumaresan, 2014, Environmental studies, 4th edition, Saras Publication, Nagercoil, TamilNadu.
2. M.Basu, and S. Xavier, 2016, Fundamentals of Environmental Studies, Cambridge University Press.
3. A.K. Mitra and R. Chakraborty, 2016, Introduction to Environmental Studies, Book Syndicate.
4. J.S. Singh, S.P.Singh, and S.R. Gupta, 2014, Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.