Acharya Nagarjuna University, Andhra Pradesh B.E./B.Tech ECE Sem 1 syllabus

MATHEMATICS I

Unit I:Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous
equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton
theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem,
diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of
quadratic form to canonical forms by orthogonal transformation.

Unit II: Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and
Maclaurin theorems with remainders (without proof);

Unit III: Multivariable calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and
minima of functions of two variables, method of Lagrange multipliers.

Unit IV: Double Integrals

Double integrals, change of order of integration, double integration in polar coordinates, areas
enclosed by plane curves.

Unit V: Multiple Integrals and Special Functions

Evaluation of triple integrals, change of variables between Cartesian,

cylindrical and spherical
polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and
gamma functions.

Textbooks:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
References:
1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science
International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson
Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

Communicative English I

UNIT-1: 6 Hrs.
1. Reading: Reading Comprehension (Skimming, Scanning & Inference)
2. Writing: Paragraph Writing
3. Grammar: Common Errors in Nouns- Pronoun Agreement
4. Vocabulary Building: Content and Functional word list -100

UNIT- II: 6 Hrs.
1. Reading: Jumbled Sentences
2. Writing: Proposal Writing
3. Grammar: Correction of Errors in Subject- Verb Agreement
4. Vocabulary Building: Sign Post, Transition signals

UNIT - III: 6 Hrs.
1. Reading: Article Review
2. Writing: Note Making, Note Taking
3. Grammar: Correction of in Tense Usage
4. Vocabulary Building: Synonyms and Antonyms

UNIT - IV: 6 Hrs.
1. Reading: Story Reflection
2. Writing: Pictorial Description
3. Grammar: Correction of Errors in Adjectives, Articles, Prepositions
4. Vocabulary Building: Root Words (200)

UNIT - V: 6 Hrs.
1. Reading: Mind Mapping
2. Writing: Information Transfer
3. Grammar: Correction of Errors in Wh- questions, Question Tags
4. Vocabulary Building: One Word Substitutes

REFERENCE BOOKS:
1. Bailey, Stephen. Academic writing: A handbook for International Students. Routledge,
2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT;
2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B10), Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Michael Swan. Practical English Usage, OUP. 1995.
6. F.T. Wood. Remedial English Grammar, Macmillan.2007
7. William Zinsser. On Writing Well. Harper Resource Book. 2001
8. Liz Hamp-Lyons and Ben Heasly. Study Writing, Cambridge University Press. 2006.
9. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad.
10. Sharon J.Gerson, Steven M.Gerson, Technical Writing, New Delhi: Pearson education,
2007.
11. Sanjay Kumar and Pushp Lata, Communication Skills, Noida: Oxford University Press,
2012.
12. Dr. Shalini Verma, Word Power Made Handy, S.Chand & Co Ltd., 2009.

Environmental Science

UNIT – I: 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 – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction
– Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of
surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral
resources: Use and exploitation, environmental effects of extracting and using mineral resources, case
studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of
modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

LEARNING OUTCOMES

Students will be able to

1. articulate the basic structure, functions, and processes of key social systems affecting the
environment.
2. explain how water resources should be used.
3. articulate basic understanding of effects of modern agriculture on environment.
4. explain how various paradigms or world views and their implicit and explicit assumptions and values
shape the viewer's perception of environmental problems and solutions.

UNIT – II: Ecosystems, Biodiversity, and its Conservation

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)

BIODIVERSITY AND ITS CONSERVATION : Definition: genetic, species and ecosystem diversity – Bio-
geographical 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-sports 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.

LEARNING OUTCOMES

Students will be able to

1. get a clear picture of structure and functions of ecosystems.
2. explain why renewable and non-renewable energy resources are important.
3. get awareness about land degradation, soil erosion & desertification.
4. gain a rigorous foundation in various scientific disciplines as they apply to environmental science,
such as ecology, evolutionary biology, hydrology, and human behavior.

UNIT – III: Environmental Pollution and Solid Waste Management

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 :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.

LEARNING OUTCOMES UNIT-3

Students will be able to

1. demonstrate knowledge and understanding of theories in the field of Biodiversity and Systematics in
the broad sense.
2. conduct basic conservation biology research.
3. explain endangered and endemic species of India.
4. identify the threats to biodiversity.

UNIT – IV: Social Issues and the Environment
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.
LEARNING OUTCOMES:
Students will be able to
1. understand Cause, effects and control measures of air pollution.
2. understand soil, noise & water pollution.
3. explain the enforcement of Environmental legislation
4. understand solid waste management.
UNIT – V: Human Population and the Environment
HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations.
Population explosion – Family Welfare Programmed. – 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.
FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain
– Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds
– river, hill slopes, etc..
LEARNING OUTCOMES
Students will have
1. knowledge about watershed management and environmental ethics.
2. explain the reasons for global warming
3. explain principles and impact of disasters on environment.
4. explain disaster management cycle in India.
TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University
Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company
REFERENCES :
1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage
Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of
India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela -
Prentice hall of India Private limited.

Engineering Physics

Unit-I : Wave Optics
Principle of Superposition-Interference of light-Theory of Interference fringes-Conditions for sustained
Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength.
Diffraction-Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum -
Determination of Wavelength.
Polarization-Polarization by reflection, refraction and double refraction-Nicol's Prism--Half wave and Quarter
wave plate- Engineering applications of Interference, Diffraction and Polarization.
Learning Outcomes:
The students will be able to
- explain various types of coherent sources (L2)
- outline the conditions for sustained interference (L2)
- identify applications of interference including homodyne and heterodyne detection (L3)

analyze the differences between interference and diffraction (L4)
illustrate the concept of polarization of light and its applications (L2)
classify the production and detection of different polarized light (L4)

Unit-II: Dielectrics and Magnetics
Introduction to Dielectrics--Electric polarization-Dielectric polarizability, Susceptability and Dielectric
constant- Types of polarizations Lorentz(internal) field-Claussius - Mosotti equation-Applications of
Dielectrics .

Introduction to Magnetics-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability-
Origin of permanent magnetic moment -Classification of Magnetic materials - Hysteresis-soft and hard

magnetic materials-Ferrites and applications.
Learning Outcomes:
The students will be able to
explain the concept of dielectric constant and polarization in dielectric materials (L2)
summarize Gauss's law in the presence of dielectrics (L2)
interpret dielectric loss, Lorentz field and Claussius- Mosotti relation (L2)
classify the magnetic materials based on susceptibility and their temperature dependence (L2)
explain the applications of dielectric and magnetic materials (L2)

Unit – III: Electromagnetic Waves and Fiber Optics
Divergence and Curl of Electric and Magnetic Fields-Maxwell's Equations- Electromagnetic wave Equation
and velocity.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-
Numerical Aperture-Classification of fibers based on Refractive index profile, modes - Propagation of

electromagnetic wave through optical fiber - -Block Diagram of Fiber optic Communication.
Learning Outcomes:
The students will be able to

apply the Gauss' Theorem for divergence and Stokes' Theorem for curl (L3)
evaluate Maxwell's displacement current and correction in Ampere's law (L3)
assess the electromagnetic wave propagation in different media and its power (L3)
explain the working principle of optical fibers and its classification based on refractive index profile
and mode of propagation (L2)
identify the applications of optical fibers in medical , communication and other fields (L2)

Unit – IV: Semiconductors

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semi conductors - Fermi
energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type Dependence of Fermi energy
on carrier concentration and temperature (Qualitative)- Direct and Indirect band gap semiconductors-Hall
effect- Hall coefficient - Applications of Hall effect - Applications of Semiconductors.

Learning Outcomes:

The students will be able to
classify the energy bands of semiconductors (L2)
outline the properties of n-type and p-type semiconductors (L2)
interpret the direct and indirect band gap in semiconductors (L2)
identify the type of semiconductor using Hall effect (L2)
list the applications of semiconductors in electronic manufacturing (L2)

Unit – V: Superconductors and Nano materials

Superconductors-Properties-Critical parameters of Superconductors-Meissner effect-BCS Theory-
Josephson effect(AC & DC)-Types of Superconductors-High TC Superconductors- Applications.

Basics of Nano materials - Preparation and characterization – CNTs - Applications of Nano materials.

Learning Outcomes:

The students will be able to
explain electrical resistivity of solids with temperature (L2)
classify superconductors based on Meissner effect (L2)
explain BCS theory , Josephson effect and high Tc materials (L2)
analyze the size dependent properties of nanomaterials (L4)

choose the methods for the preparation and characterization of CNTs (L3)

Text books:

1. M.N. Avadhanulu, P.G.Kshirsagar “A Text book of Engineering Physics”-S.Chand Publications,2017
2. H.K.Malik & A.K.Singh “Engineering Physics”,- McGraw Hill Publishing Company Ltd, 2018

Reference Books:

1. David J.Griffiths, “Introduction to Electrodynamics”- 4/e, Pearson Education,2014
2. Gerd Keiser “Optical Fiber Communications”- 4/e, Tata Mc GrawHill ,2008
3. Charles Kittel “Introduction to Solid State Physics”,Wiley Publications,2011
4. S.M.Sze “Semiconductor devices-Physics and Technology”- Wiley,2008
5. T Pradeep “A Text book of Nano Science and Nano Technology”- Tata Mc GrawHill 2013

Programming for Problem Solving

UNIT-1

Computer Basics: The Computer System, Generations of Computer, Classification of
Computer, Block diagram of digital Computer, Inside the Computer-Processor,
Memory, External Ports, PCI Card, Formatting Hard disk, Understanding BIOS,
BIOS Commands, Algorithm, Flowchart, Programming Paradigms.
C-Basics: C-character set, Data types, Constants, Expressions, Structure of C
program, Operators and their precedence & associatively, Simple programs in C using all the
operators, Type casting ,type coercion.

UNIT-II

Control Structures, Basic input and output statements, Preprocessor directives.
Functions: Concept of a function, passing the parameters, automatic variables,
scope and extent of variables, storage classes, recursion, iteration vs recursion,

types of recursion, Simple recursive and non recursive programs, Towers of Hanoi
problem.

UNIT-III

Arrays: Single and multidimensional Arrays, Character array as a string, string
functions, Programs using arrays and string manipulation.
Pointers: Pointers declarations, Pointer expressions, Pointer parameters to
functions. Pointers, Pointers and array, Pointer arithmetic.

UNIT-IV

Structures: Declaring and using structures, operations on structures, structures and
arrays, user defined data types, pointers to structures.Command line arguments.
Files: Introduction, file structure, file handling functions, file types, file error handling,
Programs using file functions.

Text Books:

1. Programming with C-Gottfried-Schaums Outline Series-TMH
2. C Programming – Anitha Goel/Ajay Mittal/E.Sreenivasa Reddy-Pearson India

References :

1. Problem Solving with C- Somasekharan-PHI.
2. C Programming- Behrouz A forouzan – CENGAGE Learning
2. Test your c skills-Yaswanth kanithker
3. Let us C- Yaswanth kanithker