

JIMS Engineering Management Technical Campus, Greater Noida

(Affiliated to GGSIP University, Dwarka, New Delhi)

Department of Applied Science (B.Tech)

Academic Year 2018-19

Vision

To cater our students to pursue both intellectual growth and professional development, balance both depth and breadth in learning experience, practice both thoughtful reflection and active application.

Mision

Committed to teach our students to question critically, think logically, communicate clearly, and live ethically. These skills serve as the foundation for living the examined life and succeeding in an increasingly global, ever-changing workplace.

PSO 1	To Enable students use mathematics to understand and solve engineering problems.
PSO 2	Physics is crucial to the understanding of the world around them. Physics encompasses the study of the universe from the largest galaxies to the smallest subatomic particles
PSO3	To Enable students to understand Nano science, medicinal chemistry, membrane technology and natural products and environment.
PSO4	To Enable students use communication skills laboratory is an integral part of the department. Students receive raining in written and verbal communication essential to succeed in the work place.

PROGRAM OUTCOMES (POs) / GRADUATE ATTRIBUTES

S. No.	Graduate Attributes	Program Outcomes (POs)
1	Managerial Knowledge	PO1: Ability to apply the knowledge of mathematics, science and engineering principles for modeling, analyzing and solving Electrical and Electronics Engineering problems.
2	Critical Thinking	PO2: Ability to identify, formulate and analyze real-life Electrical and Electronics Engineering problems.
3	Problem Solving	PO3: Ability to design and develop solutions for real-life Electrical and Electronics Engineering problems.
4	Research Skill	PO4: Ability to design and develop sophisticated equipment and experimental systems for carrying out detailed investigation to multifaceted Electrical and Electronics Engineering problems.
5	Usage of Modern Tools	PO5: Ability to develop and utilize modern tools for modeling, analyzing and solving Electrical and Electronics Engineering problems.
6	Collaborative and Multidisciplinary work	PO6: Dedication to work as an Electrical and Electronics Engineer who is capable of identifying solutions to various local and global problems faced by the society.
7	Project Management and Finance	PO7: Ability to design and develop modern systems for the upkeep of pollution free environment.
8	Communication	PO8: Willingness and ability to upkeep professional ethics and social values.
9	Life-long Learning	PO9: Willingness and ability to think independently, take initiative and lead a team of engineers or researchers.
10	Ethical Practices and Social Responsibility	PO10: Ability to express ideas clearly and communicate orally as well as in writing with others.
11	Independent and Reflective Learning	PO11: Willingness and ability to maintain lifelong learning process by way of participating in various professional activities.
12	Individual and team work	PO12: Willingness and ability to take up administrative responsibilities involving both project and financial management confidently.

APPLIED MATHEMATICS I

Code: ETMA 101

Semester: 1

L:T:P: 3:1:0

Credit: 4

After course completion students will be able to:

CO1	Understand n^{th} derivative of a function and expansions of standard functions to apply the knowledge of differential calculus in the field of engineering.. Acquire knowledge about the notion of convergence of numerical sequence and series and learn ways of testing convergence.
CO2	To apply integral calculus in various field of engineering and remember the concept of definite integral. Apart from some other applications students will have a basic understanding of Beta and Gamma functions used for evaluating surface areas and volumes and area of the surfaces generated by revolving a plane curve.
CO3	Understand the concept of matrices and the essential tools of matrices and linear algebra as eigen values and diagonalization and apply for solving linear simultaneous equations in a comprehensive manner are required.
CO4	The effective mathematical tools for the solutions of differential equations that model physical processes and to understand the concept of differentiation and apply for solving differential equations and concept of Bessel and legender polynomial.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	3	1	1	2	1	1	3
CO2	3	3	3	3	2	3	1	1	2	1	1	3
CO3	3	3	3	3	3	2	2	1	2	1	1	3
CO4	3	3	3	3	3	2	2	1	2	1	1	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	Cos
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1	<p style="text-align: center;">UNIT-I</p> <p>Successive differentiation: Leibnitz theorem for nth derivative (without proof). Infinite series: Convergence and divergence of infinite series, positive terms infinite series, necessary condition, comparison test (Limit test), D'Alembert ratio test, Integral Test, Cauchy's root test, Raabe's test and Logarithmic test(without proof). Alternating series, Leibnitz test, conditional and absolutely convergence. Taylor's and Maclaurin's expansion(without proof) of function (e^x, $\log(1+x)$, $\cos x$, $\sin x$) with remainder terms ,Taylor's and Maclaurin's series, Error and approximation.</p>	12	CO1
2	<p>UNIT-II: Asymptotes to Cartesian curves. Radius of curvature and curve tracing for Cartesian, parametric and polar curves. Integration: integration using reduction formula. Application of integration : Area under the curve, length of the curve, volumes and surface area of solids of revolution about axis only .Gamma and Beta functions.</p>	12	CO2
3	<p>UNIT-III: Matrices: Orthogonal matrix, Hermitian matrix, Skew-Hermitian matrix and Unitary matrix. Inverse of matrix by Gauss-Jordan Method (without proof). Rank of matrix by echelon and Normal (canonical) form. Linear dependence and linear independence of vectors. Consistency and inconsistency of linear system of homogeneous and non homogeneous equations . Eigen values and Eigen vectors. Properties of Eigen values (without proof). Cayley-Hamilton theorem (without proof). Diagonalization of matrix. Quadratic form, reduction of quadratic form to canonical form.</p>	12	CO3
4	<p>UNIT-IV Ordinary differential equations: First order linear differential equations, Leibnitz and Bernaulli's equation. Exact differential equations , Equations reducible to exact differential equations. Linear differential equation of higher order with constant coefficients, Homogeneous and non homogeneous differential equations reducible to linear differential equations with constant coefficients. Method of variation of parameters. Bessel's and Legendre's equations (without series solutions), Bessel's and Legendre's functions and their properties.</p>	12	CO4

Text Books:

[T1]R.K. Jain and S.R.K. Iyengar, " Numerical methods for Scientific and Engineering Computation",

New Age Publishing Delhi-2014.

[T2] B. S. Grewal, "Higher Engineering Mathematics" Khanna Publications, 2014 Edition.

Reference Books:

[R1] E. kresyzig, " Advance Engineering Mathematics", Wiley publications.

[R2] G.Hadley, " Linear Algebra" Narosa Publication.

[R3] N.M. Kapoor, " A Text Book of Differential Equations", Pitambar publication.

[R4] Wylie R, “ Advance Engineering mathematics” , McGraw-Hill.

[R5] Schaum’s Outline on Linear Algebra, Tata McGraw-Hill.

[R6] Polking and Arnold, “Ordinary Differential Equation using Mat Lab” Pearson.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom’s Category Marks	Class Test (15)	Class Performance (10)
Remember	4	3
Understand	3	2
Apply	2	2
Analyze	2	1
Evaluate	3	1
Create	1	1

End Semester Examination (75 Marks)

Bloom’s Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

APPLIED PHYSICS-I

Course Code: ETPH-103Course

Semester: I

L:T: 2:1

Credit: 3

After course completion students will be able :	
CO1	To understand the wave nature of light and use the concepts of interference and diffraction to make measurement of very small lengths like wavelength of light
CO2	To acquire theoretical and practical knowledge of modern communication devices like laser and optical fibres
CO3	To study the concepts of special relativity and to understand its effect in modern technology and also know about production generation and application of ultrasonic waves
CO4	To learn the basic concepts of nuclear physics and apply them to understand the working of devices like nuclear reactor and radiation detectors.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	3	2	3	3	2	1	1	1	1	1
CO2	3	3	3	2	3	3	2	1	3	1	1	1
CO3	2	3	3	2	3	3	1	2	1	1	3	1
CO4	2	3	3	2	2	3	2	1	1	1	2	1

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	<p style="text-align: center;">UNIT-I</p> <p>Interference: Introduction, Interference due to division of wave front: Fresnel's Biprism, Interference due to division of amplitude: wedge shaped film, Newton's rings.</p> <p>Diffraction: Introduction, Difference between Fresnel and Fraunhofer diffraction, Single slit diffraction, Transmission diffraction grating, Absent spectra.</p>	8	To understand the wave nature of light and use the concepts of interference and diffraction to make measurement of very small lengths like wavelength of light.
2	<p style="text-align: center;">UNIT-II</p> <p>Polarization: Introduction, Uniaxial crystals, Double refraction, Nicol prism, Quarter and half wave plates, Theory of production of plane, circularly and elliptically polarized lights, Specific rotation, Laurents half shade polarimeter.</p> <p>Laser: Spontaneous and stimulated emissions, Einstein's coefficients, Laser and its principle, He-Ne laser.</p>	8	To acquire theoretical and practical knowledge of modern communication devices like laser and optical fibres

	Fibre optics: Introduction, Single mode fibre, Step index and graded index multimode fibres, Acceptance angle and numerical aperture.		
3	<p style="text-align: center;">UNIT-III</p> <p>Theory of Relativity: Introduction, Frame of reference, Galilean transformation, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Mass energy relation</p> <p>Ultrasonics: Introduction, Production of ultrasonics by magnetostriction and Piezoelectric methods, Applications.</p>	8	To study the concepts of special relativity and to understand its effect in modern technology and also know about production generation and application of ultrasonic waves
4	<p style="text-align: center;">UNIT-IV</p> <p>Nuclear Physics: Introduction, Radioactivity, Alpha decay, Beta decay, Gamma decay, Q value, Threshold energy, Nuclear reactions, Nuclear fission: Liquid drop model, Nuclear fusion, Particle accelerators: Linear accelerator, Cyclotron, Radiation detectors: Ionization chamber, Geiger Mueller Counter.</p>	8	To learn the basic concepts of nuclear physics and apply them to understand the working of devices like nuclear reactor and radiation detectors.

Text Books:

1. Beiser, 'Concepts of Modern Physics', [McGraw-Hill], 6th Edition 2009
2. A. S.Vasudeva, 'Modern Engineering Physics', S. Chand, 6th Edition, 2013.

Reference Books:

1. Ghatak 'Optics', TMH, 5th Edition, 2013
2. G. Aruldas 'Engineering Physics' PHI 1st Edition, 2010.
3. Fundamentals of Optics : Jenkins and White , Latest Edition
4. C. Kittle, "Mechanics", Berkeley Physics Course, Vol.- I.
5. Feynman " The Feynman lectures on Physics Pearson Volume 3 Millennium Edition, 2013
6. Uma Mukhrji 'Engineering Physics' Narosa, 3rd Edition, 2010.
7. H.K. Malik & A. K. Singh 'Engineering Physics' [McGraw-Hill], 1st Edition, 2009.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember	4	3

Understand	3	2
Apply	3	2
Analyze	2	1
Evaluate	2	1
Create	1	1

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

JIMS Engineering Management Technical Campus, Greater Noida
(Affiliated to GGSIP University, Dwarka, New Delhi)

Department of Applied Science

Subject : Communication Skills

Subject Code: ETHS112

Program: B-Tech

Branch: CSE , ME, ECE, EE, Civil

Session: 2018-2019

Semester: 02

Prepared by:

Name: Dr Archana Rathore

Signature:

Designation: Assistant professor

Date:

Verified by:

Name:

Signature:

Designation:

Date:

Approved by: (HOD)

Name:

Signature:

Designation:

Date:

PROGRAM OUTCOMES (POs)/GRADUATE ATTRIBUTES

S. No.	Graduate Attributes	Program Outcomes (POs)
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10	Ethical Practices and Social Responsibility	PO10: Ability to express ideas clearly and communicate orally as well as in writing with others.
11	Independent and Reflective Learning	PO11: Willingness and ability to maintain lifelong learning process by way of participating in various professional activities.
12	Individual and team work	PO12: Willingness and ability to take up administrative responsibilities involving both project and financial management confidently.

Communication Skills

Course Code: ETHS-112

Semester: II

L:T:P: 2:1:0

Credit: 3

After course completion students will be able to:	
CO1	<ul style="list-style-type: none"> • Use a variety of accurate sentence structures • Develop writing and grammar skills • Produce appropriate vocabulary and correct word forms
CO2	<ul style="list-style-type: none"> • build academic vocabulary • produce academic vocabulary appropriately orally and in writing • make use of contextual clues to infer meanings of unfamiliar words from context
CO3	<ul style="list-style-type: none"> • use pre-writing strategies to plan writing • generate ideas from sources to develop content • develop coherent content and support with relevant details
CO4	<ul style="list-style-type: none"> • skim for main idea(s) • scan for details • utilize digital literacy tools to develop reading and vocabulary skills

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	1	3	2	3	3	1	1
CO2	2	3	2	1	1	2	3	3	2	2	3	2
CO3	3	2	1	2	3	1	3	2	3	3	1	1
CO4	2	3	2	1	1	2	3	3	2	2	3	2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	Cos
1	UNIT-I: Basic Remedial Grammar (Errors in Parts of Speech, Tenses, Verbs and Modal; Reported Speech; Active and Passive Voice; Conditional clauses; Question Tags and Short Responses)	6	CO1
2	UNIT-II: Vocabulary and usage (Synonyms and Antonyms; Suffixes and Prefixes; Homophones and Homonyms; One-word substitution; Prepositions; Phrasal verbs and Idioms, Indianism)	6	CO2
3	UNIT-III: (A) I. Types of writing (Expository, Descriptive, Narrative, Analytical and Argumentative) II. Definition, description and explanation of scientific objects, instruments and processes etc. III. Interpretation and use of charts, graphs and tables in technical writing.[T1],[R1] (B) I. Paragraph writing II. Precis writing Comprehension	10	CO3
4	UNIT-IV: I. Reading different types of texts (speed and purpose) II. Reading five essays III. E.M. FORSTER, <i>What I Believe</i> IV. JAMES BRYCE, <i>Some Hints on Public Speaking</i> V. L.A. HILL, <i>Principles of Good Writing</i> VI. A.P.J. ABDUL KALAM, <i>Work Brings Solace</i> VII. SALIM ALI, <i>Man and Nature in India: The Ecological Balance</i>	10	CO4

Text Books

1. Communication Skills ,by Dr Meenu Dudeja, Satya Prakashan Publication, First Edition,2016-17
2. Technical Communication: Principles and practice (OUP), (Meenakshi Raman and Sangeeta Sharma)
OXFORD UNIVERSITY PRESS
3. Communication Skills for Engineers, Murli Krishna, Pearson.
4. Wren and Martin: High School English Grammar and Composition; S. Chand

Reference Books

1. Professional Communication: Aruna Koneru, MCGRAW HILLS EDUCATION PVT. LTD
2. Wren and Martin: High School English Grammar and Composition; S. Chand
3. Advanced English Grammar and Composition: Gurudas Mukherjee & Inidbar Mukherjee; (ANE BOOKS PVT. LTD

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

APPLIED CHEMISTRY

Course Code: ETCH 113

Semester: 1

L:T:P: 2:1:2

Credit: 3

After course completion students will be able to:

CO1	Analyze different types of fuels and its characterizations. Analyze quality of fuels based on its properties and possible utilizations. Appreciate the importance of coal and its properties for the Indian and global economies. Understand the concept of cracking, cetane & octane numbers.
CO2	Understand the concept of Physical equilibria and phase diagrams. Understand cooling curves, alloy phase diagrams and their practical importance. Acquire knowledge about the principles and practice of homogenous and heterogeneous catalysis in chemistry. Understand the Kinetics of various catalysts and the role of catalyst in chemical reactions.
CO3	Identify the parameters that characterize the constituents found in potable water and wastewater. Recognize the common physical, chemical and biological unit operations encountered in treatment processes.
CO4	Understand the electrochemical fundamentals. Compare & Analyze various types of corrosion process. Acquire the knowledge of controlling various corrosive processes.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	3	1	1	2	1	1	3
CO2	3	3	3	3	2	3	1	1	2	1	1	3
CO3	3	3	3	3	3	2	2	1	2	1	1	3
CO4	3	3	3	3	3	2	2	1	2	1	1	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S.	COURSE CONTENT	HRS	Cos
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NO.			
1	<p>UNIT-I: FUELS Definition, Classification & Calorific value of fuels (gross and net), Dulong's formula (Numericals), Determination of calorific value of fuels using bomb's calorimeter (Numericals),</p> <p>Determination of calorific value of fuels using Boy's Gas Calorimeter (Numericals), Cracking – Thermal & catalytic cracking, Octane & Cetane numbers with their significance. High & Low temperature carbonization,</p> <p>Manufacture of coke (Otto – Hoffmann oven), Proximate and ultimate analysis of Coal (Numericals), Combustion of fuels(Numericals).</p>	08	CO1
2	<p>UNIT-II: PHASE RULE & CATALYSIS Definition of various terms, Gibb's Phase rule & its derivation, Application of phase rule to One component system- The water system, Application of phase rule to Two component system- The Lead-Silver system (Pattinson's process).</p> <p>Catalyst and its characteristics, Types of catalysts, Concept of promoters, inhibitors and poisons.</p> <p>Theories of catalysis: Intermediate compound formation theory, adsorption or contact theory. Application of catalysts for industrially important processes</p> <p>Enzyme catalysis: Characteristics, Kinetics & Mechanism of enzyme catalysed reaction (Michaelis-Menten equation),</p> <p>Acid-Base catalysis: Types, Kinetics & Mechanism, Catalysis by metals salts (Wilkinson's Catalyst), Auto-catalysis,</p> <p>Heterogeneous catalysis (Langmuir-Hinshelwood mechanism.</p>	08	CO2
3	<p>UNIT-III: WATER Introduction and specifications of water , Hardness and its determination by EDTA method (Numericals), Alkalinity and its determination (Numericals),</p> <p>Reverse Osmosis, Electrodialysis, Disinfection by break-point chlorination. Boiler feed water, boiler problems–scale, sludge, priming & foaming: causes & prevention, Boiler problems–caustic embrittlement & corrosion: causes & prevention, Water Softening by Internal Treatment: carbonate & phosphate conditioning, colloidal conditioning & calgon treatment Water Softening by External Treatment: Lime-Soda Process (Numericals) Zeolite & Ion-Exchange Process.</p>	08	CO3
4	<p>UNIT-IV: CORROSION & ITS CONTROL Causes, effects & consequences; Chemical or Dry corrosion & its mechanism (Pilling-Bedworth Rule)</p>	08	CO4

<p>Electrochemical or Wet Corrosion & Its mechanism, Rusting of Iron Passivity, Galvanic series, Galvanic Corrosion, Soil Corrosion Pitting Corrosion, Concentration Cell or Differential Aeration Corrosion, Stress Corrosion. Factors Influencing</p> <p>Corrosion: Nature of metal and nature of corroding environment;</p> <p>Protective measures: Galvanization, Tinning Cathodic Protection, Sacrificial Anodic protection, Electroplating, Electroless plating, Prevention of Corrosion by Material selection & Design.</p>		
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Text Books:

- [T1] P. C. Jain & Monika Jain, Engineering Chemistry, Latest edition, Dhanpat Rai Publishing Co., 2002.
 [T2] P. Mathew, Advance Chemistry, 1 & 2 Combined Editions, Cambridge University Press, 2003.

Reference Books:

- [R1] P. W. Atkins and J. De Paula, Atkins' Physical Chemistry, Oxford, 2010.
 [R2] T. Engel and P. Reid, Physical Chemistry, Pearson Education, 2013.
 [R3] K. Qanungo, Engineering Chemistry, PHI Learning Private Limited, New Delhi, 2009.
 [R4] O. G. Palanna, Engineering Chemistry, Tata McGraw Hill Education Private Limited, 2012.
 [R5] D. A. Jones, Principles and Prevention of Corrosion, Prentice Hall, 2nd Edition, 1996.
 [R6] H. K. Chopra and A. Parmar, Engineering Chemistry-A Text Book, Narosa Publishing House, 2012.
 [R7] S. Chawla, Engineering Chemistry-All India Edition, Dhanpat Rai & Co., 2003.
 [R8] R. Gadi, S. Rattan and S. Mohapatra, Environmental Studies, S.K. Kataria & Sons, 2nd Edition 2009.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember	4	3
Understand	3	2
Apply	2	2
Analyze	2	1
Evaluate	3	1
Create	1	1

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

ENVIRONMENTAL STUDIES

Course Code: ETEN-114

Semester: 2

L:T:P: 2:1:2

Credit: 3

CO1	<ul style="list-style-type: none">• The objective of this course is to make students environment conscious. They will be exposed through the fundamental concepts of environment and ecosystem so that they can appreciate the importance of individual and collective efforts to preserve and protect our environment.• Planning management of biodiversity and biological resources in the light of ecological and evolutionary dynamics.• Obtain competence on Advanced understanding of biodiversity and conservation biology that is highly valuable both for scientific and management purposes
CO2	<ul style="list-style-type: none">• An understanding of the global environmental problems caused by human activities.• How our environment is inter dependent on various factors and how human being must care for their natural surroundings
CO3	<ul style="list-style-type: none">• Fundamental concepts of air, noise, water, solid waste and nuclear pollution: their nature, generation and impact on the environment• Analyze environmental factors and evaluate strength, weakness, opportunities and threats.• Identify relationships between chemical exposure and effects on physiological systems and design strategies for study of dose-response relationships and to develop synthetic ecofriendly route for small molecules.
CO4	<ul style="list-style-type: none">• Capacity to obtain, analyse, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.• Acquire the ability to evaluate the role of law and policy in conservation and management of natural resources and prevention of pollution

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	1	3	1	2	3	1	3	3
CO2	2	2	2	3	1	3	1	1	3	1	3	3
CO3	3	2	3	3	1	2	2	1	3	1	3	3
CO4	2	2	2	3	1	2	2	1	3	1	3	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	Cos
1	<p>UNIT-I: Environmental Studies: Ecosystems, Bio-diversity and its Conservation</p> <p>(i) The Multidisciplinary Nature of Environmental Studies- Definition, scope and importance of Environmental Studies. Biotic and a biotic component of environment, need for environmental awareness.</p> <p>(ii) 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, structures and function of the following ecosystem: (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).</p> <p>(iii) Bio-diversity and its Conservation- Introduction to biodiversity —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-spots of biodiversity, Threats to biodiversity : Habitat loss, Poaching of wildlife, man-wildlife conflicts, rare endangered and threatened species(RET) endemic species of India, method of biodiversity conservation: In-situ and ex-situ conservation.</p>	8	CO1
2	<p>UNIT-II: Natural Resources: problems and prospects</p> <p>Renewable and Non-renewable Natural Resources Concept and definition of Natural Resources and need for their management</p> <ul style="list-style-type: none"> • Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people. • Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems, Water conservation, rain water harvesting, watershed management. • Mineral resources: Uses are exploitation, environmental effects of extracting and using mineral resources, case studies. 	8	CO2

	<ul style="list-style-type: none"> • Food resources: World food problems, changes causes by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. • Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Urban problems related to energy, case studies. • Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. 		
3	<p>UNIT-III: Environmental Chemistry and Pollution Control</p> <p>(i) Chemistry of Environment</p> <p>(a) Green Technology Principles of Green technology, Zero Waste Technology, Green Chemistry & Its basic principles, Atom Economy, Green Methodologies. clean development mechanisms (CDM), concept of environmental impact assessment,</p> <p>(b) Eco-Friendly polymers Environmental degradation of polymers, Biodegradable, Photo-biodegradable polymers, Hydrolysis & Hydrobiodegradable, Biopolymers & Bioplastics: polylactic acid, polyhydroxybutyrate, polycaprolactone,. Concept of bioremediation.</p> <p>(ii) Environmental Pollution</p> <p>Definition, types, 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.</p> <p>Pollution case studies. Solid waste and its management: causes, effects and control measures of urban and industrial waste.</p> <p>Chemical toxicology-Terms related to toxicity, impact of chemicals (Hg, As, Cd, Cr, Pb) on environment.</p>	8	CO3
4	<p>UNIT-IV:</p> <p>(i) Disaster Management</p> <p>Disaster management: floods, earthquake, cyclone and land-slides, nuclear accidents and holocaust, case studies.</p> <p>(ii) Social Issues, Human Population and the Environment</p> <p>Sustainable development, Climate change, global warming, acid rain, ozone layer depletion, Environmental ethics: Issues and possible solutions, Consumerism and waste products, , Wasteland reclamation. Population growth, problems of urbanisation. Environment Protection Act, 1986; Air (Prevention and Control of Pollution) Act, 1981; Water (Prevention and Control of Pollution) Act, 1974; Wildlife Protection Act, 1972; Forest Conservation Act, 1980; Environmental management system standards-ISO 14000 series.</p>	8	CO4

Text Books

1. E. Barucha, Textbook of Environmental Studies for Undergraduate Courses, Universities Press (India) Pvt. Ltd., 2005.
2. S. Chawla, A Textbook of Environmental Studies, McGraw Hill Education Private Limited, 2012

Reference Books

1. G. T. Miller, Environmental Science, Thomas Learning, 2012
2. W. Cunningham and M. A. Cunningham, Principles of Environment Science: Enquiry and Applications, Tata McGraw Hill Publication, N. Delhi, 2003.
3. R. Rajagopalan, Environmental Studies: From Crisis to Cure, 2nd Edition, Oxford University Press, 2011.

4. A.K. De, Environmental Chemistry, New Age Int. Publ. 2012,,
5. A. Kaushik and C.P. Kaushik, Perspectives in Environment Studies, 4th Edition, New Age International Publishers,2013

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember	2	2
Understand	4	2
Apply	4	2
Analyze	2	1
Evaluate	2	1
Create	1	2

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

APPLIED MATHEMATICS-III

Course Code: ETMA-201

Semester: III

L:T:P: 3:1:0

Credit: 4

After course completion students will be able :

CO1	To get the knowledge about the Fourier series and Fourier transform
CO2	To understand the basic concept of difference equation and Z-transform
CO3	To study the numerical methods for solution of algebraic and transcendental equation, linear simultaneous equation, interpolation and extrapolation.
CO4	To study the numerical methods for numerical differentiation, numerical integration, numerical solution of ordinary differential equation.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	1	1	1	2	2
CO2	3	3	3	2	2	1	1	1	1	1	2	2
CO3	3	3	3	3	3	2	2	1	2	1	2	2
CO4	3	3	3	3	3	2	2	1	2	1	2	2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	<p style="text-align: center;">UNIT-I</p> <p>Fourier series: Definition, Euler's formula, conditions for Fourier expansion, functions having points of discontinuity, change of intervals, even and odd functions, half range series, Harmonic analysis. Fourier Transforms: Definition, Fourier integral, Fourier transform, inverse Fourier transform, Fourier sine and cosine transforms, properties of Fourier transforms (linearity, scaling, shifting, modulation), Application to partial differential equations.</p>	11	To get the knowledge about the Fourier series and Fourier transform
2	<p style="text-align: center;">UNIT-II</p> <p>Difference equation: Definition, formation, solution of linear difference equation with constant coefficients, simultaneous difference equations with constant coefficients, applications of difference equations. Z-transform: Definition, Z-transform of basic functions,</p>	11	To understand the basic concept of difference equation and Z-transform

	properties of Z-transform (linearity, damping, shifting, multiplication), initial value theorem, final value theorem, convolution theorem, convergence of Z-transform, inverse of Z-transform, Application to difference equations.		
3	<p style="text-align: center;">UNIT-III</p> <p>Numerical Methods: Solution of algebraic and transcendental equations using bisection method, Regula-Falsi method and Newton – Raphson method. Solution of linear simultaneous equations using Gauss-Jacobi's iteration method and Gauss-Seidal's iteration methods. Finite differences: Forward differences, backward differences and Central differences. Interpolation: Newton's interpolation for equi-spaced values. Stirling's central difference interpolation formula, Divided differences and interpolation formula in terms of divided differences, Lagrange's interpolation formula for unequi-spaced values.</p>	11	To study the numerical methods for solution of algebraic and transcendental equation, linear simultaneous equation, interpolation and extrapolation
4	<p style="text-align: center;">UNIT-IV</p> <p>Numerical Differentiation, maxima and minima of a tabulated function. Numerical Integration: Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's one-third rule and Simpson's three-eighth rule. Numerical solution of ordinary differential equations: Picard's method, Taylor's method, Euler's method, modified Euler's method, Runge-Kutta method of fourth order.</p>	11	To study the numerical methods for numerical differentiation, numerical integration, numerical solution of ordinary differential equation

Text Books:

3. R.K. Jain and S.R.K. Iyengar, "Numerical methods for Scientific and Engineering Computation", New Age Publishing Delhi-2014.
2. B. S. Grewal, "Higher Engineering Mathematics" Khanna Publications, 2014 Edition.

Reference Books:

1. E. kresyzig, "Advance Engineering Mathematics", Wiley publications
2. P. B. Patil and U. P. Verma, "Numerical Computational Methods", Narosa
3. "Partial Differential Equations" Schaum's Outline Series, McGraw Hill.
4. Michael Greenberg, "Advance Engineering mathematics", Pearson.
5. Schaum's Outline on Fourier Analysis with Applications to Boundary Value Problem, Tata McGraw-Hill

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember	4	3
Understand	3	2
Apply	2	2
Analyze	2	1
Evaluate	3	1
Create	1	1

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

NUMERICAL ANALYSIS & STATISTICAL TECHNIQUE

Course Code: ETMA-203

Semester: III

L:T:P: 3:1:0

Credit: 4

After course completion students will be able :

CO1	To introduce to student various probability distributions and problems of uncertainty.
CO2	To understand various hypothesis and Correlation between variables.
CO3	To study the numerical methods for solution of algebraic and transcendental equation, linear simultaneous equation, interpolation and extrapolation.
CO4	To study the numerical methods for numerical differentiation, numerical integration, numerical solution of ordinary differential equation.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	1	1	1	2	2
CO2	3	3	3	2	2	1	1	1	1	1	2	2
CO3	3	3	3	3	3	2	2	1	2	1	2	2
CO4	3	3	3	3	3	2	2	1	2	1	2	2

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	COs
1	<p style="text-align: center;">UNIT-I</p> Probability Theory: conditional probability, Baye's theorem, Random variable: discrete probability distribution, continuous probability distribution, expectation, moments, moment generating function, skewness, kurtosis, binomial distribution, Poisson distribution, normal distribution, Curve Fitting: Principle of least square Method of least square and curve fitting for linear and parabolic curve	11	Student can understand the basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables

2	<p style="text-align: center;">UNIT-II</p> <p>Correlation Coefficient, Rank correlation, line of regressions and properties of regression coefficients, ANOVA, Sampling distribution: Testing of hypothesis, level of significance, sampling distribution of mean and variance, Chi-square distribution, Student's T- distribution, F- distribution, Fisher's Z- distribution</p>	11	<p>Student can come to know that how correlation is used to identify relationships between variables and also can Analyze null hypothesis.</p>
3	<p style="text-align: center;">UNIT-III</p> <p>Numerical Methods: Solution of algebraic and transcendental equations using bisection method, Regula-Falsi method and Newton – Raphson method. Solution of linear simultaneous equations using Gauss-Jacobi's iteration method and Gauss-Seidal's iteration methods. Finite differences: Forward differences, backward differences and Central differences. Interpolation: Newton's interpolation for equi-spaced values. Stirling's central difference interpolation formula, Divided differences and interpolation formula in terms of divided differences , Lagrange's interpolation formula for unequi-spaced values.</p>	11	<p>To study the numerical methods for solution of algebraic and transcendental equation, linear simultaneous equation, interpolation and extrapolation</p>
4	<p style="text-align: center;">UNIT-IV</p> <p>Numerical Differentiation, maxima and minima of a tabulated function. Numerical Integration: Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's one-third rule and Simpson's three-eighth rule .Numerical solution of ordinary differential equations: Picard's method, Taylor's method, Euler's method, modified Euler's method, Runge-Kutta method of fourth order.</p>	11	<p>To study the numerical methods for numerical differentiation, numerical integration, numerical solution of ordinary differential equation</p>

Text Books:

4. R.K. Jain and S.R.K. Iyengar," Numerical methods for Scientific and Engineering Computation", New Age Publishing Delhi-2014.
2. B. S. Grewal,"Higher Engineering Mathematics" Khanna Publications, 2014 Edition.

Reference Books:

6. R.K. Jain and S.R.K. Iyengar," Numerical methods for Scientific and Engineering Computation", NewAge P. B. Patil and U. P. Verma, " Numerical Computational Methods", Narosa

7. P. B. Patil and U. P. Verma, “ Numerical Computational Methods”, Narosa
8. Michael Greenberg, “ Advance Engineering mathematics” , Pearson

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom’s Category Marks	Class Test (15)	Class Performance (10)
Remember	4	3
Understand	3	2
Apply	2	2
Analyze	2	1
Evaluate	3	1
Create	1	1

End Semester Examination (75 Marks)

Bloom’s Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	

ENVIRONMENTAL SCIENCE

Course Code: ES 211

Semester: 3

L:T:P: 2:0:0

Credit: 2

After course completion students will be able to:	
CO1	<ul style="list-style-type: none"> • Planning management of biodiversity and biological resources in the light of ecological and evolutionary dynamics. • Obtain competence on Advanced understanding of biodiversity and conservation biology that is highly valuable both for scientific and management purposes
CO2	<ul style="list-style-type: none"> • An understanding of the global environmental problems caused by human activities • Fundamental concepts of air, noise, water, solid waste and nuclear pollution: their nature, generation and impact on the environment
CO3	<ul style="list-style-type: none"> • Acquire the ability to evaluate the role of law and policy in conservation and management of natural resources and prevention of pollution • Analyze environmental factors and evaluate strength, weakness, opportunities and threats.
CO4	<ul style="list-style-type: none"> • Able to better identify their prospective areas of work in the overall organizational function and enhance interpersonal skills and communication techniques. • Students become more aware of industry practices and regulations during industry visits. Industry visits broaden the outlook of students with exposure to different workforces from different industries.

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	3	3	3	2	1	2	3	3	3	3
CO2	1	2	3	3	3	2	1	2	3	3	3	3
CO3	2	3	3	3	2	2	1	2	3	3	3	3
CO4	2	3	2	3	3	2	1	2	3	2	3	3

[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S.	COURSE CONTENT	HRS	Cos
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NO.			
1	<p>UNIT-I: Ecosystems and how they work:</p> <p>Types of Eco-Systems, Geosphere – Biosphere and Hydrosphere introduction. Major issues of Biodiversity, Conservation of Bio-Diversity Concept of sustainability and international efforts for environmental protection: Concept of Sustainable Development, Emergence of Environmental Issues, Stockholm Conference on Environment, 1972 and Agenda 21. International Protocols, WTO, Kyoto Protocol, International Agreement on Environmental Management.</p>	14	CO1
2	<p>UNIT-II: Pollution and Public Policy</p> <p><u>Water Pollution:</u> Water Resources of India, Hydrological Cycle, Methods of Water Conservation and Management, River Action Plan, Ground and Surface Water Pollution; Waste Water Management.</p> <p><u>Air Pollution:</u> Air Pollution and Air Pollutants, Sources of Air Pollution and its Effect on Human Health and Vegetations. Green House Effect, Global Warming and Climate Change.</p> <p><u>Solid Waste:</u> Management – and Various Method Used, Composting, Land Fill Sites etc. Hazardous Waste Management, Biomedical Waste Management.</p>	16	CO2
3	<p>UNIT-III: Environmental Impact Assessment (EIA) and Environmental Management System</p> <p>(EMS): <u>Introduction to EIA</u>, its Impact, Notification of MOEF, Introduction to ISO 9000 and 14000 Standards, .</p> <p><u>Introduction to Indian Environmental laws:</u> Legal framework: , the Indian Penal Code, Role of Judiciary in Environmental Protection, Wild Life (Protection) Act, 1972, Water (Prevention and Control of Pollution) Act, 1974, Environment (Protection) Act, 1986, Air (Prevention & Control of Pollution) Act, 1981, Delhi Environment Law. w.e.f. Academic Session 2010-2011 68</p>	16	CO3
4	<p>UNIT-IV: Field work / Case Studies:</p>	6	CO4

	Visit to a related site – river / urban / rural or industrial and demonstration project including water bodies.		
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Text Books

1. Basat, A., (2008), Environment Studies, Pearson Education.
2. Nath, Manju, (2008), Environment Studies, Pearson Education.

Reference Books

1. Sayre, Don., Inside ISO 14000- The Competitive Advantage of Environmental Management, St Lucie Press Delray Beach, Florida
2. Gupta N.C., (2006), Social Auditing of Environmental Law in India, edited book, New Century Publications.
3. Divan, Shyam and Rosen Ceranz, Armin, (2007), Environmental Law and Policy in India, Cases, materials and statutes, Oxford University Press.
4. Bowles, Ian A. and Glenn T. Prickett,(2001), Footprints in the Jungle: Natural Resource Industries, Infrastructure and Biodiversity Conservation, Oxford University Press.

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember	2	2
Understand	4	2
Apply	4	2
Analyze	2	1
Evaluate	2	1
Create	1	2

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	

Understand	
Apply	
Analyze	
Evaluate	
Create	

Communication Skills	
Course Code: ETHS-112	Semester: II
L:T:P: 2:1:0	Credit: 3

After course completion students will be able to:	
CO1	<ul style="list-style-type: none"> Use a variety of accurate sentence structures Develop writing and grammar skills Produce appropriate vocabulary and correct word forms
CO2	<ul style="list-style-type: none"> build academic vocabulary produce academic vocabulary appropriately orally and in writing make use of contextual clues to infer meanings of unfamiliar words from context
CO3	<ul style="list-style-type: none"> use pre-writing strategies to plan writing generate ideas from sources to develop content develop coherent content and support with relevant details
CO4	<ul style="list-style-type: none"> skim for main idea(s) scan for details utilize digital literacy tools to develop reading and vocabulary skills

MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	1	3	2	3	3	1	1
CO2	2	3	2	1	1	2	3	3	2	2	3	2
CO3	3	2	1	2	3	1	3	2	3	3	1	1

CO4	2	3	2	1	1	2	3	3	2	2	3	2
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[3=Highly Significant, 2=Moderate Significant, 1=Least Significant]

S. NO.	COURSE CONTENT	HRS	Cos
1	UNIT-I: Basic Remedial Grammar (Errors in Parts of Speech, Tenses, Verbs and Modal; Reported Speech; Active and Passive Voice; Conditional clauses; Question Tags and Short Responses)	6	CO1
2	UNIT-II: Vocabulary and usage (Synonyms and Antonyms; Suffixes and Prefixes; Homophones and Homonyms; One-word substitution; Prepositions; Phrasal verbs and Idioms, Indianism)	6	CO2
3	UNIT-III: (A) IV. Types of writing (Expository, Descriptive, Narrative, Analytical and Argumentative) V. Definition, description and explanation of scientific objects, instruments and processes etc. VI. Interpretation and use of charts, graphs and tables in technical writing.[T1],[R1] (B) III. Paragraph writing IV. Precis writing Comprehension	10	CO3
4	UNIT-IV: VIII. Reading different types of texts (speed and purpose) IX. Reading five essays X. E.M. FORSTER, <i>What I Believe</i> XI. JAMES BRYCE, <i>Some Hints on Public Speaking</i> XII. L.A. HILL, <i>Principles of Good Writing</i> XIII. A.P.J. ABDUL KALAM, <i>Work Brings Solace</i> XIV. SALIM ALI, <i>Man and Nature in India: The Ecological Balance</i>	10	CO4

Text Books

5. Communication Skills ,by Dr Meenu Dudeja, Satya Prakashan Publication, First Edition,2016-17
6. Technical Communication: Principles and practice (OUP), (Meenakshi Raman and Sangeeta Sharma)
OXFORD UNIVERSITY PRESS
7. Communication Skills for Engineers, Murli Krishna, Pearson.
8. Wren and Martin: High School English Grammar and Composition; S. Chand

Reference Books

4. Professional Communication: Aruna Koneru, MCGRAW HILLS EDUCATION PVT. LTD
5. Wren and Martin: High School English Grammar and Composition; S. Chand
6. Advanced English Grammar and Composition: Gurudas Mukherjee & Inidbar Mukherjee; (ANE BOOKS PVT. LTD

ASSESSMENT PATTERN:

Continuous Internal Evaluation (25 Marks)

Bloom's Category Marks	Class Test (15)	Class Performance (10)
Remember		
Understand		
Apply		
Analyze		
Evaluate		
Create		

End Semester Examination (75 Marks)

Bloom's Category Marks	University Examination
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	