68102

MATHEMATICS-I

(Common to All branches)

Instruction	:	3 Periods/week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	3	End Exam Duration	:	3 Hours

Course Objectives:

1. To understand the concept of rank of a matrix and application of rank to determine the Consistency of a linear system of equations.
2. To learn and evaluate eigen values, eigen vectors of a matrix and hence find the Modal matrix of the corresponding linear transformation that transforms to Spectral matrix.
3. To acquire knowledge of using definite integrals to evaluate surface areas and volumes of solids of revolution. To have an understanding of Mean value theorems and their applications.
4. To identify the nature of a series using the appropriate test for convergence.
5. To understand the concept of partial derivatives and total derivative and to use them in finding the extreme values of a multi-variate function with or without constraints.

Unit I - Matrices

Matrices: Types of real matrices; Determinants; rank of a matrix by Echelon form and Normal form; Inverse of a matrix by Gauss-Jordan method; System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method.

Unit II - Eigen values, Eigen vectors and Quadratic Forms

Linear Transformation and Orthogonal Transformation: Eigenvalues and eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation

Unit III - Uni-Variate Calculus

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's and Maclaurin's theorems with remainders.
Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

Unit IV - Sequences and Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.
Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

Unit V - Multi-variable Calculus (Partial Differentiation and Applications)

Definitions of Limit and continuity; Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two and three variables, Method of Lagrange multipliers.

Course Outcomes : At the end of the course, the student will be able to

CO 1 : Find rank of a matrix and solve a linear system of equations.
CO 2 : Evaluate eigen values, eigen vectors and find the Modal matrix under a linear transformation.
CO 3 : Evaluate surface areas and volumes of solids of revolution, Apply Mean value theorems in relevant engineering domains.
CO 4 : Determine the convergence/divergence of a given infinite series.
CO 5 : Find the extremum of a multi-variate function with or without constraints.

Text Books :

1. Advanced Engineering Mathematics, R.K. Jain and S.R.K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, B.V.Ramana, 11th Reprint, Tata McGraw- Hill, 2010.

References :

1. Calculus and Analytical Geometry, G.B.Thomas and R.L.Finney, Pearson Publishers.
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley Publishers.
4. Advanced Engineering Mathematics, Michael Greenberg, Pearson Publishers.

ENGINEERING CHEMISTRY

(Common to all Branches)

Instruction	:	3 Periods / week	Sessional Marks	: 30
Tutorial	:	-	End Examination Marks	: 70
Credits	:	3	End Exam Duration	: 3 Hours

Course Objectives: By studying this course

1. Students are exposed to central and fundamental concepts in periodic properties and intermolecular forces in chemistry relevant to the engineering.
2. Students get awareness in electrochemical changes, corrosion and treatment of water.
3. Students learn fundamental types of organic reactions and stereochemistry.
4. Students understand micro particle behavior and molecular orbitals.
5. Students get knowledge of industrial applications of engineering materials: polymers, lubricants and refractories.

Unit I - Periodic properties and Intermolecular forces

Electronic configurations, effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, atomic and ionic sizes, ionization energies, electron affinity and electro negativity, polarizability, oxidation states, co-ordination numbers and geometries, molecular geometries. Ionic, dipolar and van Der Waals interactions.

Unit II - Electrochemistry and water technology

EMF, Galvanic cells, cell notation, cell reaction, cell potentials, Nernst equation and applications. numerical problems. Saturated Calomel electrode, potentiometric acid-base titration.

Corrosion: Introduction, causes and its effects, dry corrosion and wet corrosion, cathodic protection.

Water technology: Hardness of water, boiler troubles: scales and sludges, boiler corrosion. Internal and external treatment of water: calgon conditioning, phosphate conditioning, Zeolite method, Ion exchange method Reverse osmosis.

Unit III - Stereochemistry, Reaction Mechanism and synthesis of drug molecules

Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n-butane.

Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1, S_N2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid. Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ and $NaBH_4$. Hydroboration of olefins.

Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Unit IV - Atomic and molecular structure

Schrodinger equation. Particle in box solutions and their applications for conjugated molecules.

LCAO method, Molecular orbital theory. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Energy level diagrams of homo-nuclear and hetero-nuclear diatomic molecules: H_2, O_2, N_2, and CO. Band structure of solids and the role of doping on band structures.

Unit V - Engineering materials

Polymers: Addition polymers: preparation, properties and applications of PVC and Teflon, Condensation polymers: preparation, properties and applications of Nylon-6,6 and Terylene. Conducting polymers:poly acetylene and poly aniline and applications.

Lubricants: Criteria of a good lubricant, mechanism of lubrication, properties of lubricants: Viscosity, Cloud, pour point and flash, fire point and their Significance.

Refractories: Classification, Characteristics of a good refractory, refractoriness (pyrometric cone test and RUL test) and applications.

Course Outcomes: On completing the course the student

CO 1 : Rationalise periodic properties such as ionization potential, electron affinity, oxidation states and electronegativity.

CO 2 : Understanding the importance of EMF, corrosion and treatment of water.

CO 3 : List major chemical reactions that are used in the synthesis of molecules.

CO 4 : Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.

CO 5 : Would develop ability to handle situations involving problems associated with chemical substances in engineering situations.

Text Books:

1. Engineering Chemistry, Prasantha Rath, B.Rama Devi, Ch. Venkata Ramana Reddy & Subhendu Chakraoborty, Cengage Learning India Pvt. Ltd., 2018.
2. Text Book of Engineering Chemistry, Shasi Chawla, 3rd Edition, Dhanpat Rai Publishing Company, 2015.

References:

1. Engineering Chemistry, P.C. Jain & Monica Jain, 16th Edition, Dhanpat Rai Publishing Company, 2015.
2. Engineering Chemistry, M. Thirumala Chary & E. Laxminarayana, 3rd Edition, SCITECH Publications (India) Pvt. Ltd, 2016.

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PROBLEM SOLVING THROUGH 'C'

(Common to all branches)

Instruction	:	3 Periods / week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	3	End Exam Duration	:	3 Hours

Course Objectives:

1. To introduce student to the fundamental concepts of C programming, structured constructs and terse syntax.
2. To enable student to formulate simple algorithms for solving arithmetic and logical problems.
3. To enable student to translate algorithms into programs
4. To enable student to test and execute programs and correct syntax and logical errors.
5. To enable student to familiarize with modular programming in implementing solutions for complex problems.
6. To enable student to apply appropriate concepts like pointers, arrays, structures for a particular algorithm implementation.

Unit I – Introductory Concepts

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), Types of Programming Languages.

Idea of Algorithm: Steps to solve logical and numerical problems.

Representation of Algorithm: Flowchart/Pseudo code with some conceptual examples and exercises.

From algorithms to programs Creating and Running Programs, Syntax and Logical Errors in compilation, object and executable code.

Introductory Concepts: Introduction to C, Simple C Programs, Desirable Program Characteristics.

C Fundamentals: The C Character Set, Identifiers and Keywords, Data Types, Constants, Variables and Arrays, Declarations, Expressions.

Operators and Expressions: Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, The Conditional Operator, Library Functions.

Data Input and Output: Single Character I/O functions-getchar, putchar, I/O statements-scanf, printf, gets, puts functions.

Unit II – Programming Constructs

Control Statements: Selection Statements: 2-way selection (if, nested if, if-else), multi-way selection (else-if ladder, switch-case), break, continue statements.

Iterative Statements: Pretest Loops (for, while), posttest loops (do-while)

Functions: Defining a function, accessing a Function, Function prototypes, Passing arguments to a function, Example programs.

Program Structure: Storage Classes, Automatic variables, Extern (Global) variables, Static Variables, Register Variables.

Unit III – Recursion, Arrays

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, GCD etc.

Preprocessor Directives: File Inclusion, Macros.

Arrays: Defining an array, processing an array, passing arrays to functions.

Sorting & Searching: linear search, Bubble Sort.

Unit IV – Pointers, Strings

Multidimensional Arrays: Example programs on matrix operations

Pointers: Pointer Declarations, Passing pointers to functions, Pointers and one-dimensional Arrays, Dynamic memory allocation, operations on pointers, pointers and multidimensional arrays, arrays of pointers.

Strings: String manipulation program using user defined functions and String library functions.

Unit V – Structures and Files

Structures and Unions: Defining a structure, Processing a structure, User-defined Data Types (typedef), Structures and Pointers, Passing Structures to functions, Self-referential Structures, Unions and Enumerated Data Types, Command Line Arguments.

Files: Opening and Closing a Data file, Creating a Data File, Processing a Data File, Unformatted Data Files.

Course Outcomes: At the end of the course, the student should be able to

CO 1 : Ability to understand programming concepts and analyze a problem, design a solution and develop an algorithm to solve it.

CO 2 : Ability to modularize a problem and implement the solution using basic programming concepts, control statements and functions.

CO 3 : Ability to evaluate the use of macros and implement solutions to complex problems using recursion and homogeneous data types.

CO 4 : Ability to implement pointers for problems of relevance and use different dynamic memory allocation methods.

CO 5 : Design and implement appropriate user defined structures to a given problem definition and apply various functions for processing files.

Text Books :

1. Programming with C (Schaum's Outlines Series), Byron S. Gottfried, 3rd Edition, McGraw-Hill, 2017.
2. Programming with C, Ajay Mittal, 9th Impression, Pearson Education Ltd, 2017.

References :

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, 2nd Edition, Prentice Hall of India.
2. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, 3rd Edition, Cengage Learning.

ENVIRONMENTAL SCIENCE

(Common to all branches)

Instruction	:	3 Periods / week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	3	End Exam Duration	:	3 Hours

Course Objectives: By studying this course

1. To create awareness on significance of ecosystems and biodiversity.
2. To educate students about the importance of natural resources and their conservation.
3. To develop awareness in the students about the significance of environmental pollution.
4. To create the awareness regarding environmental management.
5. To understand the environmental legislation and sustainable development.

Unit I - Ecosystems and Biodiversity

Ecosystems: Definition of ecosystem, Structure and functions of ecosystem (Pond and Grassland ecosystems), Food chains (Grazing and Detritus), Food web and Ecological pyramids, Flow of energy, Biogeochemical cycles or Nutrient cycles: Carbon cycle and Nitrogen cycle, Biomagnification.

Biodiversity: Definition, Types of biodiversity (Species, Genetic and Ecosystem), Hotspots of biodiversity, Threats to biodiversity, Conservation of biodiversity: In-situ and Ex-situ conservation and wildlife conservation.

Unit II - Natural Resources

Renewable and Non-renewable resources, Water resources: Characteristic features of lake, Dams-Benefits and problems, Mineral resources: Mining and its environmental impacts, Renewable energy resources: Solar energy, Wind energy, Hydro energy, Tidal energy, Geothermal energy and Bioenergy, Non-renewable energy resources-Coal.

Unit III - Environmental Pollution and Control

Air pollution-Sources, effects and control measures, Greenhouse gases-Causes and consequences of Global warming, Kyoto protocol,

Ozone layer depletion, Montreal protocol. Water pollution-Sources and effects, Waste water treatment methods: Effluent Treatment Plant (ETP),Sewage Treatment Plant (STP), Brief account of Soil pollution and Noise pollution.

Unit IV - Environmental Impact Assessment

Definition and Scope of EIA, Base line data acquisition, Impacts-Cultural, Social and Bio-Physical impacts, Impact assessment methodologies- Check list method, Ad-hoc method, Leopold matrix method and Map overlay methods. Environmental Impact Statement (EIS), Environmental Management Plan (EMP), Rain water harvesting, Role of IT in Environmental management (Remote Sensing and GIS).

Unit V - Environmental Legislation and Sustainable Development

Air (Prevention and Control of Pollution) Act-1981, Water (Prevention and Control of Pollution) Act-1974, Environment Protection Act-1986, Solid Waste Management - Municipal Solid Waste, Biomedical Waste, Concept of Bioremediation, Concept of Sustainable development.

Field Trip: Study of ecosystems-Pond, lake, river and forest, Visit to a rural/urban/industrial/agricultural site.

Course Outcomes: On completing the course a student

CO 1 : Define the concepts of ecosystem and emphasize the importance of biodiversity and its conservation.

CO 2 : Gain knowledge on natural resources and advantages and disadvantages on renewable energy sources and technologies.

CO 3 : Develop awareness on pollution control technologies and global atmospheric changes.

CO 4 : Emphasize the importance of Environmental impact assessment and green technologies.

CO 5 : Understand about Environmental legislation and the concept of Sustainable development.

Text Books:

1. Text Book of Environmental Science and Technology, M. Anji Reddy, B.S. Publications, 2013.
2. Text Book of Environmental Studies, Anubha Kaushik and C.P.Kaushik, 4th Edition, New Age International Pvt. Ltd., 2014.

References:

1. Environmental Science: Towards a Sustainable Future, Richard T. Wright and Dorothy F. Boorse, 11th Edition, PHI, Learning Pvt. Ltd., 2010.
2. Environmental Engineering and Science, Gilbert M. Masters and Wendell P. Ela, 3rd Edition, PHI Learning Pvt. Ltd., 2011.

ENGINEERING DRAWING

(Common to CSE, ECE, EEE, EIE & IT)

Instruction	:	2 Periods / week	Sessional Marks	:	30
Practical	:	3 Periods / week	End Examination Marks	:	70
Credits	:	3.5	End Exam Duration	:	3 Hours

Course Objectives:

1. To understand Standards conventions and curves used in engineering practice.
2. To acquire skills to solve problems on orthographic projection of points and lines.
3. To understand orthographic projection of planes and solids.
4. To understand section of solids and development of surfaces.
5. To grasp the concept of converting isometric projection to orthographic projection and vice versa.

Unit I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance– Drawing Instruments and their Use - Conventions in Drawing –BIS Conventions. Lettering, Dimensioning.

Geometrical Constructions; Perpendicular Bisection, Angular Bisection, Dividing line into equal parts, Construction of polygons – General Method of polygon construction and Angle Method only.

Curves used in Engineering Practice: Conic Sections – Construction of Ellipse, Parabola and Hyperbola – General Method only.

Scales: Different types of Scales- Plain, Diagonal and Vernier Scales.

Unit II

Principles of Orthographic Projections – Conventions – Fundamentals of First and Third Angle projections, Projections of Points, Projection of Lines inclined to one plane and inclined to both the planes.

Unit III

Projection of Planes: Projections of regular Planes – planes parallel to one and perpendicular to other plane, planes perpendicular to one and inclined to the other, planes inclined to both planes.

Projection of Solids: Projections of Regular Solids - Cone, Cylinder, Prism, Pyramid, Cube and Tetrahedron - inclined to one and inclined to both the planes.

Unit IV

Sections of Right Regular Solids - Cone, Cylinder, Prism and Pyramid – Sectional plane parallel to one plane and perpendicular to the other only.

Development of Surfaces of Right, Regular Solids – Cone, Cylinder, Prism and Pyramid - Sectional plane parallel to one plane and perpendicular to the other only.

Unit V

Principles of Isometric Projection – Isometric Scale – Isometric Views, Conventions, Isometric Projections and Views of simple Plane figures – Regular Polygons and circle. Isometric Projections and Views of simple solids – Prism, Pyramid, Cylinder, cone and sphere.

Conversion of Isometric Views to Orthographic Views - Drawing of Front, Top and Side views from isometric views of objects **Conversion of Orthographic views to Isometric Views.**

Course Outcomes: At the end of the course, the student should be able to

CO 1	:	Know the Standard conventions, design scale for drawing engineering components and draw geometrical constructions.
CO 2	:	Apply fundamentals of theory of projections, and draw orthographic projections of points and lines in any position.
CO 3	:	Construct orthographic projections of simple planes and regular solids in any position.
CO 4	:	Draw sectional views and developments of various basic 3D objects.
CO 5	:	Construct isometric views and construct multi view drawings of simple and complex 3D objects.

Text Books:

1. Engineering Drawing, N.D. Bhat, 53rd Edition, Charotar Publishers, 2016.
2. Engineering Drawing, Basant Agrawal, 2nd Edition, Tata McGraw-Hill Publishers, 2013.

References:

1. Engineering Drawing and Graphics, Venugopal, New age Publishers, 2010.
2. Engineering Drawing, Dhananjay Johle, 1st Edition, Tata McGraw-Hill Publishers, 2007.
3. Engineering Graphics for Degree, K.C. John, PHI Learning Pvt. Ltd., 2009.
4. Engineering Drawing, K. L. Narayana and P. Kannaiah, 23rd Reprint, Scitech Publishers, 2010.

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APPLIED PHYSICS

(Common to EEE, ECE, CSE, EIE & IT Branches)

Instruction	:	3 Periods / week	Sessional Marks	:	30
Tutorial	:	-	End Examination Marks	:	70
Credits	:	3	End Exam Duration	:	3 Hours

Course Objectives: By studying this course a student would be exposed to

1. Basic concepts of lasers, construction and working of different types of lasers followed by the principles of fiber optics.
2. Basic concepts of quantum physics leading to the band theory of solids.
3. Semiconductor physics, Physics of pn junction and characteristics of different types of diodes.
4. Construction and working of bipolar transistor, JFET & MOSFET.
5. Fundamentals of nanomaterials, synthesis and their characterization.

Unit I - Lasers and Fiber optics

Characteristics of laser light, stimulated absorption, spontaneous and stimulated emission of radiation, meta-stable state, population inversion, evaluation of relation between Einstein coefficients, Ruby laser, He-Ne laser, Semiconductor laser: Homo junction and Hetero junction, Applications of lasers.

Structure of optical fiber, principle of propagation of light through optical fiber, acceptance angle, numerical aperture, types of optical fibers: step index and graded index. Losses in optical fibers, optical fiber communication and application of optical fibers.

Unit II - Quantum mechanics and Band theory of solids

The wave properties of matter, Schrodinger time independent wave equation, particle in 1-dimensional box, density of energy states, Fermi-Dirac distribution function and its variation with temperature.

The classical free electron theory, electrical conductivity of a metal: relaxation time, collision time and mean free path. Quantum theory of free electrons. Electron in a periodic potential, Bloch theorem,