

Gayatri Vidya Parishad College for Degree and PG Courses (A)

Department of Mechanical Engineering

Accredited by NBA and NAAC

B.Tech MECHANICAL ENGINEERING PROGRAM (R - 22)

SEMESTER-I

Sl. No.	Code Number	Category	Course	Hours per week			Allotment of Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	2209101	BSC	Engineering Mathematics -I	3	0	0	30	70	100	3
2	2209104	BSC	Engineering Physics	3	0	0	30	70	100	3
3	2209106	ESC	Engineering Graphics	1	0	4	30	70	100	3
4	2209107	ESC	Computer Programming with C and Numerical Methods	3	0	0	30	70	100	3
5	2209108	ESC	Electrical and Electronics Engineering	3	0	0	30	70	100	3
6	2209110P	ESC	Workshop	0	0	3	50	50	100	1.5
7	2209104P	BSC	Physics Lab	0	0	3	50	50	100	1.5
8	2209107P	ESC	Computer Programming with C and Numerical Methods Lab	0	0	3	50	50	100	1.5
			Total	13	0	13				19.5

SEMESTER-II

Sl. No.	Code Number	Category	Course	Hours per week			Allotment of Marks		Total Marks	Credits
				L	T	P	Internal	External		
1	2209201	BSC	Engineering Mathematics -II	3	0	0	30	70	100	3
2	2209203	BSC	Green Chemistry	3	0	0	30	70	100	3
3	2209209	HSSC	English	3	0	0	30	70	100	3
4	2209205	ESC	Engineering Mechanics	3	0	0	30	70	100	3
5	2209206	ESC	Data Structures	3	0	0	30	70	100	3
6	2209209P	HSSC	English Language Lab	0	0	3	50	50	100	1.5
7	2209203P	BSC	Engineering Chemistry Lab	0	0	3	50	50	100	1.5
8	2209205P	ESC	Electrical & Electronics Engineering Lab	0	0	3	50	50	100	1.5
			Total	15	0	9				19.5

ESC : Engineering Science Course
BSC : Basic Science Course
HSSC : Humanities and Social Sciences Course

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209101	Engineering Mathematics-I	3	0	0	30	70	3

COURSE OBJECTIVES

1. To transmit the knowledge of Partial differentiation.
2. To know of getting maxima and minima of function of two variables and finding errors and approximations.
3. To evaluate double and triple integrals, volumes of solids and area of curved surfaces.
4. To expand a periodical function as Fourier series and half-range Fourier series.

COURSE OUTCOMES:

CO 1: To determine the partial derivatives of functions of two or more variables.

CO 2: Evaluate maxima and minima, errors and approximations.

CO 3: Ability to evaluate double and triple integrals.

CO 4: Ability to find volumes of solids and area of curved surfaces.

CO 5: To expand a periodical function as Fourier series and half-range Fourier series.

UNIT-I

Partial Differentiation: Introduction - Functions of two or more variables - Partial derivatives - Homogeneous functions – Euler’s theorem - Total derivative - Change of variables – Jacobins.

UNIT-II

Applications of Partial Differentiation: Geometrical interpretation -Tangent plane and Normal to a surface -Taylor’s theorem for functions of two variables - Errors and approximations -Total differential. Maxima and Minima of functions of two variables - Lagrange’s method of undetermined multipliers - Differentiation under the integral Sign - Leibnitz’s rule.

UNIT-III

Multiple Integrals: Introduction - Double Integrals - Change of Order of Integration - Double Integrals in Polar Coordinates - Triple Integrals - Change of Variables.

UNIT-IV

Multiple Integrals-Applications: Area enclosed by plane curves - Volumes of solids - Area of acurved surface - Beta Function - Gamma Function - Relation between Beta and Gamma Functions.

UNIT-V

Fourier Series: Introduction - Euler's Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even Periodic Functions, Half-Range Series - Parseval's Formula.

Text Book:

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43rd Edition, Khanna publishers.

Reference Books:

1. Graduate Engineering Mathematics by V B Kumar Vatti., I.K.International publishing house Pvt. Ltd.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
6. Higher Engineering Mathematics by Dr. M.K.Venkataraman.

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209104	Engineering Physics	3	0	0	30	70	3

COURSE OBJECTIVES

The fundamentals of sciences are essential to learn as the application of science in solving problems is technology. The engineering physics curriculum is designed in such a way that all branches of engineering will study the basic fundamentals of technology from where it is originated. The course objectives are

1. To impart knowledge in basic concept of physics of Thermodynamics relevant to engineering applications.
2. To grasp the concepts of physics for electromagnetism and its application to engineering. Learn production of Ultrasonics and their applications in engineering.
3. To Develop understanding of interference, diffraction and polarization: connect it to a few engineering applications.
4. To learn basics of lasers and optical fibers and their use in some applications.
5. To understand concepts and principles in quantum mechanics and Nanophase Materials. Relate them to some applications.

COURSE OUTCOMES

By the end of this course, student would have

CO.1: Understand the fundamentals of Thermodynamics and Laws of thermodynamics. Understand the working of Carnot cycle and concept of entropy.

CO.2: Gain Knowledge on the basic concepts of electric and magnetic fields. Understand the concept of the nature of magnetic materials. Gain knowledge on electromagnetic induction and its applications.

CO.3: Understand the Theory of Superposition of waves. Understand the formation of Newton's rings and the working of Michelson's interferometer. Remember the basics of diffraction, Evaluate the path difference. Analysis of Fraunhofer Diffraction due to a single slit.

CO.4: Understand the interaction of matter with radiation, Characteristics of Lasers, Principle, working schemes of Laser and Principle of Optical Fiber. Realize their role in optical fiber communication.

CO.5: Understand the intuitive ideas of the Quantum physics and understand dual nature of matter. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent one Dimensional Schrodinger's wave equation. Understand the fundamentals and synthesis processes of Nanophase materials.

UNIT-I

THERMODYNAMICS (CO1)

Part-I

Introduction, Heat and Work, First law of thermodynamics and its applications, Reversible and Irreversible process, Carnot cycle and Efficiency (Problems based on efficiency), Carnot's Theorem.

Part-II

Second law of thermodynamics (Kelvins and Clausius statement only) , Entropy - Physical Significance, Change of entropy in reversible and irreversible process, Second law in terms of entropy, Entropy and disorder, Third law of thermodynamics (statement only).

UNIT - II

ELECTROMAGNETISM (CO2)

Gauss's law (Statement and Proof, without applications), Ampere's law (Statement and Proof, without applications), Faraday's law of induction, Lenz's law, Induced magnetic fields, Displacement current, Maxwell's equations (no derivation), propagation of electromagnetic waves in free space (Theory only). Ultrasonics: Properties of ultrasonic waves, production of ultrasonic waves by magnetostriction and piezoelectric methods, acoustic grating, applications of ultrasonics, acoustic grating.

UNIT - III

OPTICS (CO3)

Interference: Principle of superposition – Young's Experiment – Coherence - Interference in thin films (reflected light), Newton's Rings (Problems based on finding radius of curvature or wavelength), Michelson Interferometer and its applications (Theory only).

Diffraction: Introduction, Differences between interference and diffraction, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit (Qualitative and quantitative treatment)(Theory only).

Polarisation: Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate (problems based on thickness), production and detection of plane, circular and elliptical polarization (Theory only).

UNIT - IV

LASERS AND FIBRE OPTICS (CO 4)

Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, Semiconductor laser, applications of lasers (Theory only). Introduction to optical fibers, principle of propagation of light in optical fibers, Acceptance Angle and cone of a fibre, Numerical aperture (Problems based on acceptance angle and numerical aperture), Modes of propagations, classification of fibers, Fibre optics in communications, Application of optical fibers, fiber optic sensors.

UNIT - V

MODERN PHYSICS (CO. 5)

Introduction, De Broglie concept of matter waves, Heisenberg uncertainty principle, Schrodinger time dependent and independent wave equations, physical significance of wave function and its properties, application for particle in a one dimensional well – energy eigen values and eigen functions of the particles (No problems). Energy band theory of crystals, classification of conductors, semiconductors and insulators. (Theory only). **Nanophase Materials** :Introduction, properties, Top-down and bottom up approaches, Synthesis - Ball milling, Chemical vapour deposition method, sol-gel methods, Applications of nanomaterials. (Theory only).

Text Books:

1. Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand
3. Engineering Physics by R.K. Gaur and S.L. Gupta –DhanpatRai

Reference Books:

1. Modern Engineering Physics by A.S. Vadudeva
2. University Physics by Young and Freedman

ENGINEERING GRAPHICS

(Common for Civil Engineering, Mechanical Engineering)
(Effective from the admitted batch of 2022-2023)

Course code	Periods			Total contact hours/ per week	Sessional Marks	Exam Marks	Total Marks	Credits
	L	T	P					
2209106	2	0	3	5	30	70	100	3

*L-Lecture, T-Tutorial, P-Practical

COURSE OBJECTIVES

COB 1: The course is aimed at developing Basic Graphic skills.

COB 2: Develop Skills in Preparation of Basic Drawings

COB 3: Skills in Reading and Interpretation of Engineering Drawings

COURSE OUTCOMES

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

- CO 1 Graphically construct and understand, the importance of mathematical curves in Engineering applications
- CO 2 Graphically visualize and construct orthographic projection of points and lines
- CO 3 Visualize and construct different views of planes and solids in different orientations
- CO 4 Construct and develop the sectioned surfaces of geometrical solids
- CO 5 Interpret and draw the Orthographic and Isometric views of different solids.

SYLLABUS

UNIT-I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions.

Curves: Construction of Conic sections by using general method, Construction of cycloid (No Epicycloid and Hypo cycloid) and Involute (Regular shapes) - Normal and tangent to the curves.

UNIT – II

Projections of Points and Straight Lines: Principal or Reference Planes - Projections of a point lying in any one of the four quadrants. Projections of straight lines parallel to both reference planes

- perpendicular to one reference plane and parallel to other reference plane - inclined to one plane and parallel to the other - Projections of straight line inclined to both the reference planes .

UNIT – III

Projections of Planes: Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other - perpendicular to one reference plane and inclined to other plane - Projection of Oblique planes. Introduction to Auxiliary Planes.

Projections of Solids: Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane - vertical plane -parallel to both the reference planes - Projection of Solids with axis inclined to one reference plane and parallel to other - inclined to both the reference planes.

UNIT – IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section - Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple positions only. Development of Surfaces: Methods of Development: Parallel line development and radial line development - Development of a cube, prism, cylinder, pyramid and cone.

UNIT – V

Isometric Views: Isometric projection - Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, sphere and Asymmetrical shapes.

TEXT BOOKS:

Elementary Engineering Drawing by N.D. Bhatt, Charotar Publishing House.

REFERENCE BOOKS:

Engineering Graphics by K.L. Narayana and P. Kannaiah, Tata Mc-Graw Hill.

I Year I Semester

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209107	Computer Programming with C & Numerical Methods (For CIVIL & MECHANICAL ENGINEERING)	3	0	0	30	70	3

COURSE OBJECTIVES

1. Aims to provide exposure to problem-solving through C programming.
2. Aims to train the student to the basic concepts of the C-programming language and Numerical Methods.

COURSE OUTCOMES

- CO1.Student will be able to write basic programs in C.
CO2.Student will be able to write code using control structures.
CO3.Student will be able to write code using strings & functions.
CO4.Student will be able to write code using Pointers, Structures and Unions.
CO5.Student will be able to write code for Numerical & Integral Methods.

UNIT-I

Introduction to C: Basic structure of C program, Constants, Variables and data types, Operators and Expressions, Arithmetic Precedence and associativity, Type Conversions, Managing Input and Output Operations Formatted Input, Formatted Output.

UNIT-II

Decision Making, Branching and Looping: Decision making with if statement, Simple if statement, the if...else statement, Nesting of if...else statement, the else if ladder, switch statement, the (? :) operator, the GOTO statement. The while statement, The do statement, The for statement, Jumps in Loops. **Arrays:** Definitions, One-dimensional and two-dimensional Arrays.

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UNIT-III

Functions & Strings: Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return Values, Arguments with Return Values, No Argument but Returns a Value, Functions that Return Multiple Values. Nesting of functions, Recursion. **Strings:** Character Arrays. Declaration and initialization of Strings, reading and writing of strings, String handling functions.

UNIT-IV

Pointers: Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions. **Structures and Unions:** Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures.

UNIT-V

Solutions of Algebraic and Transcendental Equations: Bisection Method, Newton Raphson Method. Interpolation: Newton's forward and backward Interpolation, Lagrange's Interpolation in unequal intervals, Trapezoidal rule, Simpson's 1/3 rule. Solutions of Ordinary First Order Differential Equations: Euler's Method, Modified Euler's Method and Runge-Kutta Method.

Text Books:

1. Programming in ANSIC, E Balagurusamy, 6th Edition. McGraw Hill Education(India)Private Limited.
2. Introduction to Numerical Methods, SS Sastry, Prentice Hall.

Reference Books:

1. Let Us C, YashwantKanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.ForouzanandR.F.Gilberg, 3rd Edition, Thomson, 2007.
3. The C –Programming Language` B.W. Kernighan, Dennis M. Ritchie, PHI
4. Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M.Barone (Author), Enzo Marinari (Author), Giovanni Organtini,World

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15/08/2019

ELECTRICAL & ELECTRONICS ENGINEERING

Course code	Credits	Periods			Exam Hrs.	Sessional Marks	Exam Marks	Total Marks
		Theory	Tutorial	Lab				
2209108	4	5	-	-	3	30	70	100

Upon the completion of this course students will have

CO1: An ability to explain the basic concepts of magnetic circuits and electric circuits (Level-4).

CO2: An ability to understand the fundamental concepts of DC generators and motors (Level-2).

CO3: An ability to understand and analyze the fundamentals of AC Machines (transformers, Synchronous machine)(Level-2).

CO4: An ability to explain and analyze the operation of diodes and rectifiers. (Level-4).

CO5: An ability to analyze the operation of Bipolar junction transistors. (Level-4)

SYLLABUS:

UNIT-I

MAGNETIC CIRCUITS & A.C. CIRCUITS: Definitions of magnetic circuit, Reluctance, Magnetomotive force (m.m.f), Magnetic flux, Simple problems on magnetic circuits, Hysteresis loss.

Kirchoff laws (KCL & KVL), simple problems on KCL & KVL, R-L Series circuit, R-C Series circuit, R-L-C Series circuit, Simple problems on (R-L, R-C, R-L-C Series circuits), R-L Parallel circuit, R-C Parallel circuit, R-L-C Parallel circuit. (**Concepts are limited to these topics only & Consider all the topics are elementary level**).

UNIT-II

D.C. MACHINES: D.C. generator principle, Construction of D.C. generator, E.M.F. equation of D.C. generator, Simple problems based on EMF equation of a D.C Generator, Types of D.C. generators, Voltage equations for all types of Generators, Simple problems on voltage equation of D.C Generators, Applications of D.C. generators. (**Concepts are limited to these topics only & Consider all the topics are elementary level**).

D.C. motor principle, Significance of back E.M.F, Torque equation of D.C. motors, Simple problems on Torque equation of a D.C Motor, Types of D.C. motors, Simple Problems on Voltage equations of a D.C motors, Applications of D.C. motors. (**Concepts are limited to these topics only & Consider all the topics are elementary level**).

UNIT-III

A.C MACHINES: Transformer principle, E.M.F. equation of transformer, Transformer on NO-Load operation, Operation of Transformer on load, Equivalent circuit of transformer, Voltage regulation of

transformer, Losses in a transformer, Calculation of efficiency and regulation by open circuit and short circuit tests.

Alternator working principle, Construction of 3-Phase Synchronous Generator, E.M.F equation of alternator, Voltage regulation by synchronous impedance method. (Concepts are limited to these topics only & Consider all the topics are elementary level).

UNIT-IV

DIODES AND RECTIFIERS: P-N Junction diode operation and their V-I Characteristics, Zener diode operation and their V-I characteristics, Zener diode as a Voltage regulator.

Rectifiers, Half wave rectifier operation (without filter) and waveforms, derivation of ripple factor, efficiency of Half wave rectifiers, Full wave center-tapped rectifier operation (without filter) and waveforms, derivation of ripple factor, efficiency of Full wave center-tapped rectifier, Full wave bridge rectifier operation (without filter) and waveforms, derivation of ripple factor, efficiency of Full wave bridge rectifier. (Concepts are limited to these topics only & Consider all the topics are elementary level).

UNIT-V

BIPOLAR JUNCTION TRANSISTOR (BJT): Bipolar Junction Transistor, Symbol, operation of PNP & NPN Transistors.

BJT configurations- Common Emitter Configuration and their characteristics, Common Base Configuration and their characteristics, Common collector configuration and their characteristics. (Concepts are limited to these topics only & Consider all the topics are elementary level).

Text Books:

1. Principles of Electrical Engineering and Electronics by V.K. Mehta, S. Chand & Co.
2. A Text book on Electrical Technology volume-I,II by B. L.THEREJA

Reference:

1. A First Course in Electrical Engineering by D.P Kothari.
2. Electrical Machines by J.B Gupta
3. A Text book on Electronic Devices & Circuits by Sanjeev Gupta, Santosh Gupta.

WORKSHOP LAB

(Common for CE and Mechanical Engineering)

(Effective from the admitted batch of 2022-2023)

Course code	Periods			Total contact hours/ per week	Sessional Marks	Exam Marks	Total Marks	Credits
	L	T	P					
2209110P	0	0	3	3	50	50	100	1.5

COURSE OUTCOMES

- CO 1 Identify and use various tools required for performing operations in Carpentry for making various components
- CO 2 Identify and use various tools required for performing operations in Fitting for making various components
- CO 3 Identify and use various tools required for performing operations in Tin-smithy for making various components
- CO 4 Identify and Usage of House Wiring applications.

LIST OF EXPERIMENTS:

S.No	Trade	Job
1.	Carpentry	(a) Cross Lap Joint (b) Corner Dovetail Joint (c) Mortise and Tenon Joint (d) Bridle Joint
2.	Fitting	(a) V-Fit (b) Square Fit (c) Half Round Fit (d) Dovetail Fit
3.	Tin Smithy	(a) Taper Tray (b) Square Tray (c) 90° Elbow (d) Funnel
4.	House Wiring	(a) Wiring of two bulbs in Parallel (b) Wiring of two bulbs in Series (c) Wiring to control a lamp with two-way switches (d) Wiring to control a fluorescent tube light with one-way switch

REFERENCE

1. Elements of workshop technology, Vol.1 by S. K. and H. K. Choudary.
2. A course in Workshop Technology, Vol.1 by B.S.Raghuwanshi, Danpat Rain and M.S. Krishnan (NPTEL).

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209104P	Engineering Physics Lab	0	0	3	50	50	1.5

COURSE OBJECTIVES

To train the student in acquiring skills, techniques of using instruments to observe the physical phenomena, to measure certain physical quantities and constants.

COURSE OUTCOMES

By the end of the course

CO1: Experiment and evaluate basic principles of physics by observing and analyzing the data, plotting graphs and interpreting the results.

List of Laboratory Experiments:

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray μ_o and Extraordinary μ_e ray.
6. Determination of Thickness Given Paper Strip by Wedge Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.
14. Planks Constants.
15. Determination of energy band gap of a given semiconductor.

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209107P	Computer Programming with C & Numerical Methods LAB (For MECHANICAL ENGINEERING)	0	0	3	50	50	1.5

COURSE OBJECTIVES

1. To provide complete knowledge of C language.
2. To develop logics which will help them to create programs, applications in C.
3. To learn the basic programming constructs they can easily switch over to any other language in future.

COURSE OUTCOMES:

CO1: Ability to implement the programs using control structures & arrays

CO2: Ability to implement the programs using strings & functions

CO3: Ability to implement the programs using user defined datatypes

CO4: Ability to implement the programs using numerical & integral methods

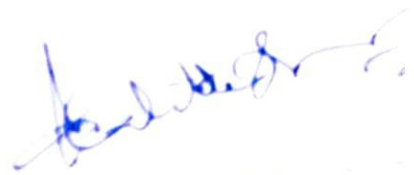
1. a) Write a C program to find the roots of a quadratic equation.
b) Write a C program, which takes two integer operands and one operator from the user performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch statement.
c) Write a C program to find the sum of individual digits of that number and also print and save it in reverse order.
2. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?
3. Write a program which generates 100 random real numbers in the range of 10.0 to 20.0 and sort them in descending order.
4. Write a function for transporting a square matrix in place (in place means that you are not allowed to have full temporary matrix).
5. Write a program to add two matrices with the dimension of the matrix specified by the user at the time of executing the program.
6. Write a program e.g. for getting a sub-string from a given position, copying one string to another, reversing a string and adding one string to another with and without using string manipulation functions.

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7. Write a program to read the data of four students, each student has a name (string), roll number (string), age (integer), use an array of structure. Later find the average age of the students.
 8. Implement bisection method to find the square root of a given number to a given accuracy.
 9. Given a table of x and corresponding $f(x)$ values, write a program which will determine $f(x)$ value at an intermediate x value using Lagrange Interpolation.
 10. Implement Simpson's $1/3^{\text{rd}}$ rule for numerical integration.
 11. Write a program to solve a differential equation using Runge-Kutta Method.
 12. Some problems in mechanical engineering.
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CHAIRMAN
B.O.S.



Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209201	Engineering Mathematics-II	3	0	0	30	70	3

COURSE OBJECTIVES

- The way of obtaining rank, Eigen values and Eigen vectors of a matrix.
- To know the importance of Cayley-Hamilton theorem and getting canonical form from a given quadratic form.
- To solve the system of equations by using direct and indirect methods.
- To solve first order and higher order differential equations by various methods.
- To obtain the Laplace transforms and inverse Laplace transforms for a given functions and their applications.

COURSE OUTCOMES

- CO1: Find rank, Eigen values and Eigen vectors of a matrix and understand the importance of Cayley-Hamilton theorem.
- CO2: Reduce quadratic form to canonical forms and solving linear systems by direct and indirect methods.
- CO3: Demonstrate solutions to first order differential equations by various methods and solve basic applications problems related to electrical circuits, orthogonal trajectories and Newton's law of cooling
- CO4: Discriminate among the structure and procedure of solving higher order differential equations with constant and variable coefficients.
- CO5: Understand Laplace transforms and its properties and finding the solution of ordinary differential equations.

UNIT-I

Matrix Algebra: Rank of a matrix- Echelon form, Normal Form - Solution of Linear System of Equations - Consistency of Linear System of Equations - Gauss elimination method, LU Factorization method, Complex Matrices: Hermitian, Skew-Hermitian and Unitary Matrices and their Properties.

UNIT-II

Eigen Values and Eigen Vectors: Eigen Values and Eigen Vectors of a Matrix - Cayley-Hamilton theorem - Inverse and Powers of a Matrix using Cayley-Hamilton's theorem and its applications.

Diagonalization of a Matrix - Quadratic Forms - Reduction of Quadratic Form to Canonical Form - Nature of a Quadratic Form.

UNIT-III

Ordinary Differential Equations of First Order and its Applications: Formation of ordinary differential equations (ODEs) - Solution of an ordinary differential equation - Equations of the first order and first degree - Linear differential equation - Bernoulli's equation - Exact differential equations - Equations reducible to exact equations - Orthogonal Trajectories - Simple Electric (LR & CR) Circuits - Newton's Law of Cooling - Law of Natural growth and decay.

UNIT-IV

Differential Equations of Higher Order: Solutions of Linear Ordinary Differential Equations with Constant Coefficients - Rules for finding the complimentary function - Rules for finding the particular integral - Method of variation of parameters - Cauchy's linear equation - Legendre's linear equation - Simultaneous linear differential equations.

UNIT-V

Laplace Transforms: Introduction - Existence Conditions - Transforms of Elementary Functions - Properties of Laplace Transforms - Transforms of Derivatives - Transforms of Integrals - Multiplication by t^n - Division by t - Evaluation of integrals by Laplace Transforms - Inverse Laplace Transform - Applications of Laplace Transforms to Ordinary Differential Equations - Simultaneous Linear Differential Equations with Constant Coefficients - Second Shifting Theorem - Laplace Transforms of Unit Step Function, Unit Impulse Function and Laplace Transforms of Periodic Functions.

Text Book:

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43rd Edition, Khanna publishers.

Reference Books:

1. Graduate Engineering Mathematics by V B Kumar Vatti., I.K. International publishing house Pvt. Ltd.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal. Lakshmi Publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209203	Green Chemistry	3	0	0	30	70	3

COURSE OBJECTIVES

CO 1: To apply the basic knowledge of Chemistry to the Engineering Discipline.

CO 2: To develop knowledge about water and its treatment for industrial and potable purposes.

CO 3: To develop understanding in the areas of Batteries, Fuels Mechanism of Corrosion of Metals and Corrosion Control Methods, Green Chemistry and Technology and Processes involving Green Chemistry and apply the knowledge for solving existing challenges faced in various engineering and societal areas.

LEARNING OUTCOMES:

LO 1: The students are able to apply the basic concepts and principles studied in Chemistry to the field of Engineering.

LO 2: The students are able to apply chemistry to different branches of engineering.

LO 3: The students are able to acquire the knowledge in the areas of Water Chemistry, Mechanism of Corrosion of Metals and Corrosion Control Methods, Batteries, Fuel Cells, Green Chemistry and Technology and Processes involving Green Chemistry and suggest innovative solutions for existing challenges in these areas.

UNIT-I

Water Technology: Sources of Water – Impurities – WHO Limits – Hardness and its Determination by EDTA method– Boiler Troubles– Water Softening Methods – Lime-Soda, Zeolite and Ion Exchange - Municipal Water Treatment-Break Point Chlorination – Desalination of Sea Water : Reverse Osmosis and Electrodialysis. Methods

UNIT-II

Batteries: Definition, types, Primary batteries: Zinc-carbon (Leclanche type), zinc alkaline (Duracell), zinc/air batteries; Lithium primary cells – . Secondary batteries: Lead acid and VRLA (valve regulated (sealed) lead acid), nickel-cadmium, nickel-metal hydride batteries, lithium ion batteries, ultrathin lithium polymer cells. Advanced Batteries for electric vehicles: requirements of the battery – sodium-beta and redox batteries.

UNIT-III

Fuel Cells: Definition, Description, working principle, advantages, disadvantages, H₂-O₂ fuel cells: alkaline fuel cells, phosphoric acid, solid oxide, molten carbonate, methanol fuel cells- Proton Membrane fuel cells.

UNIT-IV

Corrosion: Origin and Theory – Types of Corrosion: Chemical and Electrochemical; Pitting, Waterline, and Stress corrosion – Galvanic Series – Factors Effecting Corrosion. Corrosion Controlling Methods: Protective Coatings: Metallic Coatings, Electroplating and Electroless Plating.

UNIT-V

Green Chemistry and Technology: Introduction and significance of Green Chemistry, goals of green chemistry, 12 principles of green chemistry, toxicity of chemicals, material safety data sheet (MSDS), concept of zero pollution technologies: atom economy, functional toxicity Vs non-functional toxicity, functional group approaches to green chemistry, Elimination of toxic functional group, optimization of frame works for the design of the greener synthetic pathways, applications of green chemistry – Green solvents, green fuels and propellants, biocatalysis.

Text Books:

1. Engineering Chemistry – PC Jain and M. Jain – Dhanpath Rai and Sons, New Delhi.
2. A Text book of Engineering Chemistry – S. S. Dara – S. Chand & Co. New Delhi. 3. Dell, Ronald M Rand, David A J, 'Understanding Batteries', Royal Society of Chemistry, (2001).
3. Hand Book of Green Chemistry and Technology; by James Clarke and Duncan Macquarrie; Blakwell Publishing.

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209209	English	3	0	0	30	70	3

COURSE OUTCOMES

CO-1:

- Addressing explicit and implicit meanings of a text on current topics.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

CO-2:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, emails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.
- Participating in discussions and influencing them and communicating ideas effectively.
- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.

CO-3:

- Analyzing a topic of discussion and relating it to time management skills.
- Participating in discussions and influencing them.
Communicating ideas effectively.
Presenting ideas coherently within a stipulated time.

CO-4:

- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.
- Adapting to a given situation and developing a functional approach to finding solutions: adaptability and problem solving.
- Understanding the importance of helping others: community services and enthusiasm.

CO-5:

- The student will learn to avoid redundancy will learn common abbreviations useful for competitive exams and will acquire basic proficiency in English including reading, comprehension and writing skills.
- The student will be motivated with a sense of purpose throughout the course by learning life skills.

DETAILED SYLLABUS

Topics:

On the conduct of life: William Hazlitt

Life skills: Values and Ethics

If: Rudyard Kipling

The Brook: Alfred Tennyson

Life skills: Self-Improvement

How I Became a Public Speaker: George Bernard Shaw

The Death Trap: Saki

Life skills: Time Management

On saving Time: Seneca

Chindu Yellama

Life skills: Innovation

Muhammad Yunus

Politics and the English Language: George Orwell

Life skills: Motivation

Dancer with a White Parasol: Ranjana Dave

Grammar:

Prepositions – Articles – Noun-Pronoun Agreement, Subject-Verb Agreement – Misplaced Modifiers – Clichés, Redundancies, Punctuations.

Vocabulary:

Introduction to Word Formation – Root Words from other Languages – Prefixes and Suffixes – Synonyms, Antonyms – Common Abbreviations

Writing:

E-mail writing– Principles of Good Writing – Essay Writing –Paragraph Writing (with hints) Writing a Summary.

Textbook:

Language and Life: A Skills Approach Board of Editors, Orient Black swan Publishers, India. 2018.

Reference Books:

Practical English Usage. Michael Swan. OUP. 1995.

Remedial English Grammar. F.T. Wood. Macmillan.2007

On Writing Well. William Zinsser. Harper Resource Book. 2001

1.Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.

2.Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

3.Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

4. University Physics by Young & Freedman

5. Nonconventional Energy by Ashoke V. Desai

GAYATRI VIDYA PARISHAD COLLEGE FOR DEGREE&P.G.COURSES (A)
ENGINEERING & TECHNOLOGY PROGRAM
DEPARTMENT OF MECHANICAL ENGINEERING

Course code	Title of the course	Contact periods for delivering the course	Credits
2209205	ENGINEERING MECHANICS	L T P 3 0 0	3

COURSE OBJECTIVES:

- To make the students to know the importance of this subject in the field of engineering particularly related to Mechanical Engineering.
- To make them learn the fundamentals of Mechanics, equation of static equilibrium & dynamic equilibrium of particles and rigid bodies.
- To learn the effect of friction on equilibrium of bodies.
- To learn kinematics, kinetics of particle and rigid body
- To make the students ready for learning the courses such as Mechanics of solids, Theory of machines, Fluid mechanics and Machine design

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO 1	Compute the resultant of different coplanar and non-coplanar force systems and analyze the equilibrium of coplanar and non-coplanar force systems
CO 2	Study the equilibrium of bodies on rough planes in different cases
CO 3	Locate centroid and centre of gravity of plane figures and material bodies respectively and to compute area moment of inertia and mass moment of inertia of simple plane figures and simple material bodies respectively.
CO 4	Analyze the rectilinear motion and curvilinear motion of a particle and rigid body under the study of kinematics and kinetics
CO5	Analyze the rotation of a rigid body about a fixed axis and plane motion of a rigid body under the study of kinematics and kinetics

ENGINEERING MECHANICS

SYLLABUS

UNIT- I:

Force systems in a plane:

Concept of force and force system and types of force systems; Principle of transmissibility, principle of superposition; Concept of Resultant of a force system- parallelogram law of forces, triangle law of forces, polygon law of forces; Concept of moment of a force - Varignon's theorem; Resultant of concurrent, parallel and general case of forces in a plane; Concept of equilibrium - Lame's theorem - Equilibrium equations - Free body diagram; Equilibrium of coplanar concurrent force system, parallel force system and general case of forces in a plane.

UNIT- II:

Friction:

Concept of friction- types of friction- laws of friction- limiting friction-coefficient of friction- angle of friction- angle of repose - Equilibrium of bodies on a rough horizontal plane, rough inclined plane- Impending motion of connected bodies- ladder friction - wedge friction.

UNIT- III:

Centroid and Centroid of Gravity: Concept of centroid and centre of gravity- Centroid of simple plane figures - Centroid of composite plane figures - Centre of gravity of simple bodies - Centre of gravity of composite bodies - Theorems of Pappus.

Moment of Inertia: Area Moment of inertia, Polar moment of inertia, Perpendicular axis theorem, Parallel-axis theorem; Radius of gyration; Determination of area moment of inertia of simple plane figures (rectangle, square, triangle, circle, semi-circle, quarter circle only) ; Area moment of inertia of composite plane figures; Concept of mass moment of Inertia; moment of inertia of simple bodies (slender rod, circular disc, solid cylinder, solid right circular cone, solid sphere and solid hemisphere only).

UNIT- IV:

Rectilinear Translation: Introduction to kinematics and kinetics; Kinematics of rectilinear motion – equations of motion of particles under uniform and non-uniform accelerations; Kinetics of rectilinear motion - D'Alembert's principle and its application in rectilinear motion ; Law of conservation of energy ; work - energy equation in rectilinear motion; Momentum and impulse – Impulse-momentum equation.

Curvilinear Translation: Kinematics of curvilinear motion, curvilinear motion described by rectangular components, normal and tangential components only; projectile motion, D'Alembert's principle in curvilinear motion.

UNIT-V:

Rotation and plane motion of a rigid body: Rotation of a rigid body about a fixed axis: Kinematics of rotation - Equation of motion for a rigid body rotating about a fixed axis under uniform and non-uniform angular accelerations; D'Alembert's principle of rotation. Kinematics of plane motion - instantaneous centre (simple problems); D'Alembert's principle in plane motion.

Text Books:

1. Engineering Mechanics – Statics and Dynamics by A.K.Tayal, Umesh Publications, 14th edition
2. Engineering Mechanics by S.Timoshenko & D.H. Young , McGraw-Hill, (4th edition)
3. Engineering Mechanics by S.S.Bhavikatti, New Age International Publishers, 8th edition

References:

1. Engineering Mechanics, Vol.1 & 2 by J.L. Meriam, L.G. Kraige, J.N.Bolton, John Wiley & Sons, 9th edition
2. Engineering Mechanics – Statics and Dynamics by A.Nelson, TMH
3. Engineering Mechanics by Basudeb Bhattacharyya, Oxford University Press. (2nd edition)
4. Engineering Mechanics – Statics and Dynamics by K.Vijay Kumar Reddy, J.Suresh Kumar, B.S. Publications, 3rd edition

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209206	Data Structures (For MECHANICAL ENGINEERING)	3	0	0	30	70	3

COURSE OBJECTIVES

1. To understand recursive algorithms and basic concepts of data structures.
2. To learn linear data structures such as Stacks, Queues and Linked lists.
3. To learn Nonlinear data structures such as Trees and Graphs.
4. To understand and solve searching and sorting techniques.
5. To solve problems using data structures such as stacks, queues, linear lists, trees and graphs.

COURSE OUTCOMES

At the end of the course student will be able to:

- CO1: Understand the implementation of Stacks and Queues using Arrays and their applications.
CO2: Describe various types of linked lists and their implementation.
CO3: Construct various types of trees and their traversal techniques.
CO4: Discuss the computational efficiency of the principal algorithms for sorting and searching.
CO5: Describe how graphs are represented in memory and graph traversals.

UNIT – I

Introduction to Data Structures: Abstract Data Types, Definition of Data Structures. **Stacks:** Stack as an Abstract Data Type, Primitive Operations, Implementing Stack Operations using Arrays. Infix to Postfix Conversions, Postfix Evaluation and Recursion. **Queues:** Queue as an Abstract Data Type, Types of Queues, Operations, Implementation using Arrays.

UNIT – II

Linked List: Operations, Implementation of Single Linked Lists, Stacks and Queues using Single Linked Lists, Doubly Linked Lists, Dequeues.

UNIT- III

Trees: Binary Trees - Definitions and Operations, Binary Tree Representation: Node Representation, Implicit array Representation. Binary Tree Traversals, Binary Search Trees and operations.

SYLLABUS APPROVED & RATIFIED


CHAIRMAN
B.O.S.



UNIT –IV

Searching: Introduction to Algorithmic Time Efficiency, Basic Searching Techniques: Linear Search, Binary Search, Interpolation Search. Time efficiencies of searching techniques. **Sorting:** Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort, and Time Efficiencies.

UNIT – V

Graphs and Their Application: Definition of Graphs, Representation using Adjacency Matrix, Linked Representation of Graphs, Topological Ordering of nodes, Graph Traversals: BFS(Breadth First Search) and DFS (Depth First Search).

Text Books:

1. Data Structures Using C and C++ Yaddish Langsam, Moshe J .Augenstein and Aaron M. Tanenbaum.Prentice Hall Of India(2ndEdition)
2. Data Structure and Algorithm, Prof. Maria Rukadikar S

Reference Book:

1. Data Structures, Algorithms and Applications with C++, Sahani Mc-Graw Hill.

SYLLABUS APPROVED & RATIFIED

CHAIRMAN
B.O.S.



Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209209P	English Language Lab	0	0	3	50	50	1.5

COURSE OBJECTIVES

1. To make students recognize the sounds of English through Audio-Visual aids;
2. To help students build their confidence and help them to overcome their inhibitions and self-consciousness while speaking in English;
3. To familiarize the students with stress and intonation and enable them to speak English effectively; and
4. To give learners exposure to and practice in speaking in both formal and informal contexts.

COURSE OUTCOMES

CO1: Students will be sensitized towards recognition of English sound patterns and the fluency in their speech will be enhanced;

CO2: Students will be able to participate in group activities like roleplays, group discussions and debates; and

CO3: Students will be able to express themselves fluently and accurately in social as well professional context.

Topics:

Introduction to Phonetics: The Sounds of English (Speech sound – vowels and consonants) - Stress and Intonation - Accent and Rhythm.

Listening Skills: Listening for gist and specific information - listening for Note taking, summarizing and for opinions - Listening to the speeches of eminent personalities.

Speaking Skills: Self-introduction - Conversation Skills (Introducing and taking leave) - Giving and asking for information - Role Play - Just A Minute (JAM) session - Telephone etiquette.

Reading and Writing skills: Reading Comprehension – Précis Writing - E-Mail writing - Punctuation.

Presentation skills: Verbal and non-verbal communication - Body Language - Making a Presentation.

DISTRIBUTION AND WEIGHTAGE OF MARKS

- The practical examinations for the English Language Lab shall be conducted as per the University norms prescribed for the core Engineering practical sessions.
- For the Language lab sessions, there shall be a continuous evaluation during the semester for 50 sessional marks and 50 semester-end Examination marks.
- For the 50 sessional (Internal) marks, 30 marks shall be awarded for day-to-day performance and for completing activities in the lab manual, 20 marks to be awarded by conducting Internal Lab Test(s).
- For the 50 Semester- end (External) marks, 30 marks shall be awarded for written examination (dialogues, the sounds of English and stress) and 20 marks for External Examiner viva-voce.

Reference Books:

- Ashraf Rizvi. Effective Technical Communication. Tata McGraw Hill Education Private Limited, New Delhi.
- Speak Well. Orient Blackswan Publishers, Hyderabad.
- Allan Pease. Body Language. Manjul Publishing House, New Delhi.

Course code	Title of the Course	Contact Hours/week			Allotment of Marks		Credits
		L	T	P	Int.	Ext	
2209203P	Green Chemistry LAB	0	0	3	50	50	1.5

COURSE OUTCOMES

At the end of the course student will be able to:

Course outcomes: At the end of the course the student shall be able to

CO 1: Determine the quality of the ground water sample.

CO 2: Determine the metal ions using titrimetry.

CO 3: Explain the functioning of the instruments like pH metry, Conductometry and Potentiometry .

CO 4: Use spectrophotometry to determine the metal ions.

List of Laboratory Experiments

(Any 10 experiments to be performed during the semester)

1. Determination of sodium hydroxide with HCl .
2. Determination of Fe (II) by potassium dichromate.
3. Determination of Fe(II) by permanganometry.
4. Determination of chromium (VI) by hypo.
5. Determination of Zinc by EDTA method.
6. Determination of hardness of water sample by EDTA method.
7. Determination of available chlorine in water .
8. Determination of sulphuric acid in lead-acid storage cell.
9. Determination of carbonate and bicarbonate in a mixer.
10. Determination of strength of an acid by pH metric method.
11. Determination of citric acid in a citrus fruit by conductometric method.
12. Determination of Fe(II) in Mohr's salt by potentiometric method.
13. Construction of Galvanic cell.
14. Determination of Fe(III) by spectrophotometry.
15. Optimization of structure of the compound using Gaussian software.
16. Preparation of Biodiesel from vegetable oils.

Reference Books:

1. Vogel's Quantitative Chemical Analysis – V Edition – Longman

ELECTRICAL & ELECTRONICS LAB

<i>Course Code</i>	<i>Credits</i>	<i>Periods</i>			<i>Exam Hrs.</i>	<i>Sessional Marks</i>	<i>Exam Marks</i>	<i>Total Marks</i>
		<i>Theory</i>	<i>Tutorial</i>	<i>Lab</i>				
2209205P	1.5	-	-	3	3	50	50	100

COURSE OUTCOMES

By the end of course a student would be able to

1. Verify Ohm's law and Kirchhoff's law, superposition theorem for a given resistive network excited by a D.C. source.
2. Determine Regulation of a single phase transformer, Alternator, and efficiency of a Three-Phase Induction motor, D.C Shunt motor.
3. Explain the behaviour of PN junction diode & zener diode with their volt ampere characteristics.
4. Understand the operation of CRO & Verification of truth tables of logic gates & flip-flops practically.
5. Explain & analyse the addition & subtraction of two 8 bit numbers in 8085 microprocessor.

LIST OF EXPERIMENTS

1. Verification of Ohm's law & Kirchhoff's law
2. Verification of Superposition Theorem
3. Open circuit test and short circuit test on 1-phase transformer
4. No load and blocked rotor tests on 3-phase squirrel cage Induction motor
5. Regulation of alternator by synchronous Impedance method
6. Brake test on a D.C Shunt motor.
7. V-I Characteristics of P-N Junction diode & zener diode
8. Full Wave Rectifier with filter
9. Study of Cathode Ray Oscilloscope (CRO).
10. Verification of Logic Gates.
11. Verification of flip-flops.
12. Write a program on addition and subtraction of two 8 bit numbers of 8085 microprocessors.