I Semester: Physics Cycle

Sl.No.	Code	Subject	Dept/Board	Category	Hrs/week			Credits
					L	T	P	
1	MA0401	Engineering Mathematics-I	Mathematics	GC	4	0	0	4
2	PH0401	Engineering Physics	Physics	GC	4	0	0	4
3	CV0401	Engineering Mechanics	Civil Engg	GC	4	0	0	4
4	ME0401	Mechanical Engg. Sciences	Mech. / I &P. Engg.	C	4	0	0	4
5	EE0401	Basic Electrical Engg.	E & E Engg.	GC	4	0	0	4
6	PH0101	Engineering Physics Lab	Physics	GC	0	0	3	1.5
7	ME0101	General Engg. Practice	Mech. Engg.	GC	0	0	3	1.5
8	AD0201	Introduction to Engg. Design	Respective Engg. Departments.	C	2	0	0	2
9	KA0001	Kannada Kali	Humanities	GC	2	0	0	----
Total					30			25

I Semester: Chemistry Cycle

Sl.No.	Code	Subject	Dept/Board	Category	Hrs/week			Credits
					L	T	P	
1	MA0401	Engineering Mathematics-I	Mathematics	GC	4	0	0	4
2	CH0401	Engineering Chemistry	Chemistry	GC	4	0	0	4
3	CS0401	Computer concepts and C programming	C.Sc. Engg.	GC	4	0	0	4
4	EC0401	Electronics Fundamentals	E & C Engg.	GC	4	0	0	4
5	ME0402	Computer aided Engg. Drawing	Mech. / I.P. Engg.	C	2	0	4	4
6	CH0101	Engineering Chemistry Lab	Chemistry	GC	0	0	3	1.5
7	CS0101	Computer Programming Lab	C.Sc. Engg.	GC	0	0	3	1.5
8	HS0201	English Enhancement Course	Humanities	GC	2	0	0	2
Total					30			25

Index for Notations used for Category

C	Core
GC	General Core

II Semester : Physics Cycle

Sl.No.	Code	Subject	Dept/Board	Category	Hrs/week			Credits
					L	T	P	
1	MA0402	Engineering Mathematics-II	Mathematics	GC	4	0	0	4
2	PH0401	Engineering Physics	Physics	GC	4	0	0	4
3	CV0401	Engineering Mechanics	Civil Engg	GC	4	0	0	4
4	ME0401	Mechanical Engg. Sciences	Mech. / I &P. Engg.	C	4	0	0	4
5	EE0401	Basic Electrical Engg.	E & E Engg.	GC	4	0	0	4
6	PH0101	Engineering Physics Lab	Physics	GC	0	0	3	1.5
7	ME0101	General Engg. Practice	Mech. Engg.	GC	0	0	3	1.5
8	AD0201	Introduction to Engg. Design	Respective Engg. Departments.	C	2	0	0	2
9	KA0001	Kannada Kali	Humanities	GC	2	0	0	----
Total					30			25

II Semester: Chemistry Cycle

Sl.No.	Code	Subject	Dept/Board	Category	Hrs/week			Credits
					L	T	P	
1	MA0402	Engineering Mathematics-II	Mathematics	GC	4	0	0	4
2	CH0401	Engineering Chemistry	Chemistry	GC	4	0	0	4
3	CS0401	Computer concepts and C programming	C.Sc. Engg.	GC	4	0	0	4
4	EC0401	Electronics Fundamentals	E & C Engg.	GC	4	0	0	4
5	ME0402	Computer aided Engg. Drawing	Mech. / I.P. Engg.	C	2	0	4	4
6	CH0101	Engineering Chemistry Lab	Chemistry	GC	0	0	3	1.5
7	CS0101	Computer Programming Lab	C.Sc. Engg.	GC	0	0	3	1.5
8	HS0201	English Enhancement Course	Humanities	GC	2	0	0	2
Total					30			25

Index for Notations used for Category

C	Core
GC	General Core

ENGINEERING MATHEMATICS – I (4:0:0)

(Common to all branches)

Sub Code :	**MA0401**	**CIE :**	**50% Marks**
Hrs/Week :	**04**	**SEE :**	**50% Marks**
SEE Hrs :	**03**	**Total Hrs : 52 Hrs**	**Max. Marks : 100**

Course Outcomes:

On successful completion of the course the students will be able to:

1. Apply Leibnitz theorem to find the n^{th} derivative, translate any differentiable function in power series, compute the value of the indeterminate forms and also obtain p-r equations for polar curves.
2. Compute the radius of curvature and apply the concept of partial differentiation to estimate the extreme values and also errors and approximations for a function of two variables.
3. Compute measures of central tendency, dispersion, skewness and kurtosis for a given statistical data.
4. Use various techniques to compute the value of the integrals and apply these methods to compute area, perimeter and volume by tracing the curves.
5. Operate elementary transformations on matrices to solve system of linear equations, compute Eigen values and Eigen vectors.
6. Solve first order ordinary differential equation arising from physical and modeling problems by standard mathematical methods and produce the orthogonal trajectories of the given family of curves.

Unit – I **Differential Calculus – 1**

Successive differentiation – n^{th} derivative of standard functions – Illustrative Examples, Leibnitz theorem (without proof). (SLE: Cauchy's mean value theorem - problems) Indeterminate forms of the type – 1^{∞}, $0^0, \infty^0$. Expansion of functions of one variable – Taylor's and Maclaurin's expansions. Polar curves – Angle between the radius vector and tangent, angle between two curves, pedal equation for polar curves.

9 hrs

Unit – II **Differential Calculus – 2**

Curvature and Radius of curvature – Cartesian, polar and pedal forms. Partial Differentiation, Total derivative, Chain rule, Taylor's expansion for a function of two variables. Extreme values for a function of two variables, Applications- Errors and approximations (SLE: ρ using parametric and polar formulae, Jacobians - simple problems). **9 hrs**

Unit – III **Statistics**

(SLE: Collection & classification of a given data and its graphical representation), Measures of central tendency- mean, median, mode, Measures of dispersion- Quartile deviation, Mean deviation and Standard deviation, moments, skewness, kurtosis. **8 hrs**

Unit - IV **Integral calculus**

Differentiation under the integral sign with constant limits, Reduction formulae for the integrals of $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$, and evaluation of these with standard limits and problems. [SLE: Reduction formula of $\tan^n x$, $\cot^n x$, $\sec^n x$, $\text{cosec}^n x$]. Tracing of Cartesian, polar and parametric curves. Applications connected with standard curves (Astroid, Cycloid, Cardioide). **9 hrs**

Unit-V **Linear Algebra**

Elementary transformations of a matrix, Rank of a matrix by elementary row transformations, Consistency of a system of linear algebraic equations, Solution of a system of homogenous and non homogeneous equations (SLE: Gauss elimination method, Gauss Jordan method). Eigen values and Eigen vectors of a square matrix, Diagonalisation of a square matrix. **8 hrs**

Unit-VI **Differential Equations**

Introduction- physical meaning, solution of exact , reducible to exact differential equations, (SLE: Linear and reducible to linear forms) Orthogonal trajectories, equations of first order and higher degree (p-y-x equations), Clairaut's equation- simple problems, applications. **9 hrs**

Text Books :

1. Higher Engineering Mathematics – B.S. Grewal, 42nd edition, Khanna Publications.

2. Advanced Engineering Mathematics – Erwin Kreyszig, vol I & II , wiley publications, 10th edition.

Reference Books :

1. Advanced Engg. Mathematics – H. K. Dass, Chand Publications.

2. Higher Engg. Mathematics – B. V. Ramanna, Tata McGraw-Hill Publications.

3. Advanced Engineering Mathematics – Peter O Neil; Thomas, Broks / Cole, 7th edition – 2011.

ENGINEERING PHYSICS (4:0:0)

Sub Code : PH0401	**CIE : 50 %**
Hrs/Week : 04	**SEE : 50 %**
SEE Hrs. : 03	**Max. Marks : 100**

Course Outcome:

On successful completion of the course, the students will be able to,

1. Apply the knowledge of dual nature of matter and radiation to subatmoic particles.
2. Use the principles of Quantum mechanics to understand the behaviour of electrons in metals.
3. Differentiate types of Vibrations and solve the problems associated with moving frames.
4. Understand various types of Lasers and Optical fiber systems.
5. Identify crystal structures of the different materials.
6. Distinguish various types of materials based on their properties.

Unit I: Modern Physics

Particle nature of radiation: Photo-electric effect, Compton effect. Wave nature of particle: de Broglie hypothesis – de Broglie wavelength, extension to electron particle. Davisson and Germer Experiment.

Matter waves and their Characteristic properties. Phase velocity, group velocity and Particle velocity. Relation between phase velocity and group velocity. Relation between group velocity and particle velocity. Expression for deBroglie wavelength using group velocity.

Heisenberg's uncertainty principle and its physical significance(no derivation). Application of uncertainty principle (Non-existence of electron in the nucleus).

SLE: Introduction to Blackbody radiation spectrum

9 **Hours**

Unit II: Quantum Mechanics and Quantum theory of free-electron

Wave function. Properties and Physical significance of a wave function. Probability density and Normalisation of wave function. Setting up of a one dimensional, time independent Schrödinger wave equation. Eigen values and eigen function. Application of Schrödinger wave equation – Energy eigen values for a free particle. Energy eigen values and eigen functions of a particle in a potential well of infinite depth.

Failure of classical free-electron theory. Quantum free-electron theory - Assumptions. Fermi - Dirac Statistics(Qualitative). Fermi-energy – Fermi factor. Density of states (with derivation). Expression for electrical resistivity / conductivity. Effect of temperature and impurities on resistivity of metals. Merits of Quantum free – electron theory.

SLE: Salient features of classical free electron theory, drift velocity, mobility, relaxation time, expression for conductivity.

9 **Hours**

Unit III: Theory of Vibration, Special theory of relativity

Damped vibrations: Cases of over damping, critical damping and underdamping, forced vibrations, amplitude resonance.

Galilean transformations(No derivation), postulates of relativity, Lorentz transformation equations in one dimension(No derivation), Lorentz-Fitzarald length contraction, Time dilation, Addition of velocities, Variation of mass with velocity (No derivation), Equivalence of mass and energy.

SLE: SHM, Free vibrations, Frame of reference

7 **Hours**

Unit IV: Lasers and Optical Fibers

Principle and production. Einstein's coefficients (expression for energy density). Requisites of a Laser system. Condition for Laser action. Principle, Construction and working of Ruby, Helium- Neon and semiconductor Laser. Applications of Laser – Measurement of atmospheric pollutants. Holography – Principle of Recording and reconstruction of 3-D images. Selected applications of holography.

Propagation mechanism in optical fibers. Angle of acceptance. Numerical aperture. Types of optical fibers and modes of propagation. Attenuation. Applications – block diagram and discussion of point to point communication.

SLE: Coherent and Incoherent radaitions, LED.

9 **hours**

Unit V: Crystal Structure

Space lattice, Bravais lattice - unit cell, primitive cell. Lattice parameters. Direction and planes in a crystal. Miller indices. Expression for inter-planar spacing. Co-ordination number. Crystal structures of NaCl and CsCl. X-rays, Production of X-rays, Continuous and Characteristic X-rays, Mosleys law, Bragg's Law. Determination of d-spacing and wavelength by Bragg's x-ray spectrometer.

SLE: Seven Crystal System.

9 Hours

Unit VI: Dielectric, Super conducting and Nano Materials.

Dielectric constant and polarisation of dielectric materials. Types of polarisation. Equation for internal fields in solids (one dimensional). Classius – Mussoti equation. Frequency dependence of dielectric constant.

Superconductivity: Properties, Meissner Effect, Type-I, Type-II superconductors, BCS Theory of superconductors, Applications: superconducting magnets, MAGLEV.

Nano materials, Effect of nanoscale dimension, Classification of nano materials, Properties and applications of nano systems, Carbon Nano tube.

SLE: Differnce between dia and para magnetic materials.

9 **Hours**

Text Books:

1. Concepts of Modern Physics (Sixth Edition) – By Arthur Beiser, Tata Mc Graw – Hill Publication, 1998
2. Solid State Physics(Fifth Edition) – By S O Pillai, New Age International

Reference books

1. A Text book of Osicllations, Waves and Acoustics- By M Ghosh and Bhattacharya, S Chand Publication
2. Waves and Oscillations – By N Subramanyam and Brijlal, Vikas Publishing house Pvt. Ltd.
3. Biomedical Nano structures- By Kenneth E. Gonsalves, Craig R. Halberstadt, Cato T. Laurencin, Lakshmi S. Nair, J. Wiley & Sons.
4. Nano systems- Molecular Machinery, Manufacturing and Computation- By K. Eric Drexler, J. Wiley & Sons.
5. Perspectives of Modern Physics-By Arthur Beizer, Tata McGraw Hill.
6. Introduction to solid state physics-By C. Kittel, Wiley India Pvt. Ltd.
7. Introduction to solid state physics- By N.D. Mermin & Aschcroft, Cengage Learning, Inc.
8. Laser Fundamentals-By Willam T Silfvast, Cambridge University Press.
9. Engineering Physics – By Gauer & Guptha, Dhanpathrai and Sons, New Delhi

ENGINEERING MECHANICS (4:0:0)

Sub Code : CV0401 **CIE : 50% Marks**
Hrs/week : 04 **SEE : 50% Marks**
SEE Hrs : 03 **Max. Marks : 100**

Course Outcomes

After successful completion of course, student will be able to:

1. Analyze coplanar system of forces acting on rigid bodies, beams and frames

2. Compute centroid and moment of inertia of sections

3. Analyze the motion of bodies and forces acting on them.

Unit - I

Introduction to Statics

Definition of a force, characteristics of a force, sign conventions, concept of rigid body and particle, Principle of transmissibility of forces, system of forces.

Coplanar Concurrent System

Concept of resultant force – Parallelogram law, triangle law, Polygonal law, ***Graphical method of finding the resultant.*** Resolution and composition of forces, Resultant of coplanar concurrent system of forces, conditions of equilibrium, Equilibrant of a force system, Free body diagram.

8 Hrs

Self Learning Exercise: *Proof of Lami's theorem.*

Unit – II

Coplanar Non-Concurrent System

Moment of a force about a point, Varignon's theorem, couple, transformation of a force into force - couple system, conditions of equilibrium , Determination of support reactions for simply supported and cantilever beam. **8 Hrs**

Self Learning Exercise*: Compound beams*

Unit - III

Centroid & Moment of inertia

Centroid

Definition of centroid and center of gravity, centroid of line and simple plane figures, and composite areas. Centroid of any plane figures from first principles.

Moment of Inertia

Definition of moment of Inertia, moment of Inertia of simple plane figures, parallel axis theorem, perpendicular axis theorem, moment of Inertia of composite areas, Radius of gyration.

12 Hrs

Self Learning Exercise: *(i) centroid of composite line (ii) product moment of inertia*

Unit – IV

Friction

Definition of basic terms, laws of friction, block friction on horizontal and inclined surfaces, wedge friction, ladder friction, Belt friction. **6 Hrs**

Self Learning Exercise: *Rolling friction*

Unit – V

Analysis of trusses

Introduction, Elements of a truss, Common types of trusses, perfect, redundant and deficit trusses, Assumptions and analysis of plane perfect trusses and girders by method of joints.

6 Hrs

Self Learning Exercise: *Member forces in trusses by method of sections.*

Unit -VI

Kinetics and Work, Power and Energy

Kinetics

Definitions of Kinetics, D'Alembert's Principle. Dynamic equilibrium, Application of these concepts for solutions of problems involving rectilinear motion of rigid bodies on horizontal and inclined planes.

6 Hrs

Self Learning Exercise*: Lift motion*

Work, Power and Energy

Definitions & units of work power and energy, work energy equation for rectilinear translation. Problem on work, power and energy. **6 Hrs**

Self Learning Exercise*: Derivation of work energy equation*

Text Book

1. P.N. Chandra Mouli **"Engineering Mechanics"** PHI Learning – 2011

Reference Books

1. Rajashekharan S. and Sankarsubramanian. G **"Engineering Mechanics –Statics and Dynamics"**- Vikas Publishing House – 3rd Edition, 2005, Reprint 2011
2. Stephen Timoshenko, D. Young, J Rao **" Engineering Mechanics"** , Tata-McGraw Hill, Special Indian edition, 2006
3. Beer FP and Johnson ER, **"Mechanics for Engineers- Dynamics and Statics"**- 3rd SI Metric edition, Tata McGraw Hill. - 2008
4. Shames IH, **"Engineering Mechanics – Statics & Dynamics"-** PHI - 2009
5. Prasad IB, **"Text Book of Applied Mechanics"**- Khanna Publishers – 2001
6. J. L. Meriam and L. G. Kraige, **"Engineering Mechanics: Statics"**, Don Fowley Publishers, 2006.

Mechanical Engineering Sciences (4-0-0-4)

Sub Code: ME0401 **CIE:50%**
Hrs / Week: 04 **SEE:50%**
SEE: 3 Hrs **Max. Marks: 100**

Course Prerequisites: None

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Describe the sources of energy & summarize the working principle of an Internal Combustion Engine.
2. Elucidate the working principles of Turbines and Refrigerator.
3. Distinguish Power transmission systems and Recommend appropriate values for functional elements such as Gears, Gear Trains & Belt Drives.
4. Outline the manufacturing process and Discussion of basic principles of Casting, Forging, Extrusion and Rolling.
5. Identify the principles of operation of machine tools and explain the fundamental Metal joining processes.
6. Demonstrate self-learning capability.

Course Content

UNIT – 1

Introduction: Role of Mechanical Engineering Science in Technology, Definitions with examples: Mechanisms, Machines, Prime Movers & Machine Tools.

Description of Source of Energy and their conversion system: Conventional (Fossil fuels, hydel energy) and Non-Conventional (Solar flat plate collector, Wind, Tidal, Geothermal, Bio-gas, Nuclear).

Prime Movers: Classification, Internal Combustion Engines:Brief Description of 2-Stroke & 4-stroke, Petrol & Diesel engines: working principle, Simple numerical on I.C. Engine.

SLE:Classification of Internal Combustion Engines.

10 Hrs

UNIT – 2

Turbines:

Steam turbine: Introduction,Classification, Working principle of impulse & reaction turbines.

Gas turbine: Introduction,Classification, Working principle of open and close type. ***Hydraulic turbine***:Introduction,Classification, Working principle of impulse (Pelton Wheel)& reaction (Francis) turbines.

Refrigeration & Air-conditioning: Introduction, Working principle of Vapour Compression & Air-conditioning systems

SLE:Types of refrigerants& their properties

08 Hrs

UNIT – 3

Power Transmission: Classification of Power transmission system

Belt Drives: working principle of Flat belt drives (open and cross), V-belt drives, slip & creep, Expression for velocity Ratio, Ratio of belt tension and Power transmitted [without derivations] and Simple Numerical.

Gear Drives: Classification, Spur, Helical, Bevel and Worm Gears, Expression for velocity ratio[without derivations], Gear trains: simple & compound gear trains andSimple Numerical.

SLE: Working principle of rope and chain drive.

08 Hrs

UNIT – 4

Manufacturing Processes: Introduction and classification. ***Casting:*** Principle, casting procedure, Properties of moulding sands. ***Forging:*** Principle, Different forging operations. ***Extrusion:*** Principle,Hot and cold extrusion. ***Rolling:***Principle,Production of seamless pipes and tubes

SLE:Common defects in casting& their remedies.

08 Hrs

UNIT – 5

Machine Tools:Lathe: Working Principle of engine lathe, Main parts of lathe, Operations on lathe: Turning, facing, knurling, thread cutting, taper turning and drilling.

Drilling Machine:Working Principle, Radial drilling machine, Operations on drilling machines: Drilling, Boring, Reaming and Tapping.

Grinding Machine:Working Principle of cylindrical and surface grinding machines

SLE:Selection of grinding wheel

10 Hrs

UNIT – 6

Metal Joining Processes: Introduction to Soldering, Brazing and Welding, Brief description of Arc welding.

Lubrication and Bearing:

Lubrication:Classification and Properties of Lubricants,Brief description to Ring, Splash and Syphon Wick lubricators.

Bearing: Classification, Brief description toJournal bearing, thrust bearing, Ball & Roller bearings.

SLE: Types of Oxy-Acetylene Welding Flames.

08 Hrs

Text Books:

1. Elements of Mechanical Engineering by K.P. Roy, S K Hajra Choudhury, A K Hajra Choudhury, Media Promoters, 2012

Reference Books:

1. Elements of Mechanical Engineering by K R Gopalakrishna, Subhash Publishers, Bangalore
2. Workshop Technology, Vol I & II, - by SK Hajra Choudhury, A K Hajra Choudhury, Nirjhar roy, 11th edition 2001, Media Promotors and Publishers, Mumbai

Basic Electrical Engineering (4-0-0)

Sub code	**: EE0401**	**CIE**	**: 50% Marks**
Hrs/week	**: 4+0+0**	**SEE**	**: 50% Marks**
SEE Hrs	**: 3**	**Max marks**	**: 100**

Course Outcomes

On successful completion of the course students will be able to:

1. Recall basic concepts of circuit theory and Electromagnetism.
2. Analyse single phase and three phase AC circuits.
3. Explain basic constructional features and operating principles of Transformers, Rotating machines and Electrical measuring instruments.
4. Enumerate methods of domestic wiring, concept of earthing and electrical safety devices.

UNIT-1:D. C. Circuits: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series-parallel circuits excited by independent voltage sources, Concept of Power and Energy. Illustrative examples.

Electromagnetism: Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced emf's. Concept of self inductance, mutual inductance and coefficient of coupling,

7 Hours

SLE: Energy stored in magnetic field.

UNIT-2: Single-phase A.C. Circuits: Generation of sinusoidal voltage, definition of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities. Analysis with phasor diagrams series and parallel circuits comprising of Circuit elements in R,L and C. Impedance and Power Triangles, Power factor.

9 Hours

SLE: Advantages of PF improvement.

UNIT-3: Three Phase Circuits: Necessity of three phase systems , generation of three phase power, definition of Phase sequence, balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced three-phase circuits, Measurement of power by two-wattmeter method, Illustrative examples.

7 Hours

SLE: Advantages of three phase systems over Single phase systems.

UNIT-4: DC Machines: Construction of DC machines, Working principle of DC generator, Emf equation of a generator, terminal voltage, Types of generators, Introduction to DC motor, Back emf, Torque equation, Necessity of a starter, motor characteristics, application of DC motors. Illustrative examples

Transformers: Principle of operation and construction of single-phase transformers, emf equation, losses, efficiency and voltage regulation. Illustrative problems **12 Hours**

SLE: Comparison between Power and Distribution transformer

UNIT-5: Synchronous Generators: Principle of operation, Constructional features and types, Synchronous speed and frequency, Induced emf, Regulation of an alternator, ratings of an alternator. Illustrative examples.
Three Phase Induction Motors: Construction, rotating magnetic field, Principle of operation, slip, rotor current frequency, torque slip characteristics, Induction motor starting, Applications. Illustrative examples **10 Hours**

SLE: Star-delta starter.

UNIT-6: Measuring Instruments: Moving coil and Moving iron Instruments**,** Construction and Principle of operation of dynamometer type wattmeter and Induction type energy meter.
Wiring and protection devices: Service connection, wiring, wiring schemes, fuses and Miniature Circuit Breaker (MCB), Electric shock.
Earthing: Pipe, Plate. **7 Hours**
SLE: Earth leakage circuit breakers

TEXT BOOKS:

1. Dr.K. Uma Rao, **"Elements of Electrical Engineering",** I.K. International Publishing House. Pvt.Ltd
2. D.C.Kulshreshta, **" Basic Electrical Engineering''**, 2009 Edition, TMH.
3. M.V.Rao, "Basic Electrical Engineering'', Fifth Edition.

REFERENCE:

1. Vincent Del Toro, **"Electrical Engineering Fundamentals"** , Prentice Hall Publications
2. H Cotton, **"Electrical Technology",** CBS Publishers & Distributors, 2004.
3. Dr. K Uma Rao and A Jayalakshmi **"Basic Electrical Engineering",** , Sanguine publishers
4. nptel.ac.in/courses/108108076/
5. www.youtube.com/watch?v=LISEfA-yuvg

Engineering Physics laboratory (0:0:3)

Sub Code : PH0101 **Hrs/ Week: 03**

(Minimum of Ten experiments to be performed)

On successful completion of the course, the students will be able to,

1. Understand the basic concepts and principles of experimental physics.
2. Apply the knowledge of basic concepts and principles of experimental physics in measurements of various physical quantities which in turn give insight into the behavioral properties of radiation and matter.

List of Experiments:

1. Series and Parallel LCR Circuits.
2. Determination of dielectric constant by charging and discharging of capacitor.
3. Band Gap of a Semiconductor
4. Verification of inverse square law of γ rays using GM counter.
5. Measurement of wavelength of Hg Source using diffraction grating.
6. Determination of Planck's Constant using LED
7. Verification of Stefan's law
8. Torsional Pendulum
9. Young's Modulus - By Double cantilever
10. Determination of Numerical aperture of an optical fiber.
11. Determination of wavelength of a monochromatic light using Newton's rings.
12. Biprism

Text Book:

1. Laboratory manual for Engineering Physics Lab.

Reference Books:

1. Engineering Physics Lab manual-B N Subbarao, Suhas Publication

2. PHYWE-A laboratory experiments in Physics.

General Engineering Practice (0-0-3-1.5)

Sub Code : ME0101 **CIE : 50 Marks**
Hrs / Week: 03 **SET: 3 Hrs**

Course Outcome:

Upon successful completion of this course, the student will be able to:

1. Explain the use of basic hand tools such as spanners, Pliers, screw drivers, Allen keys and punches.
2. Carry out in a scientific manner, basic workshop practices such as filing, marking, punching, drilling, tapping & welding.
3. Develop the basic models using fitting, welding& sheet metal operations.
4. Identify simple electrical problems in house hold appliances and carry out repair/maintenance.
5. Select appropriate fire extinguishers.

Course Content:

1. Introduction to General Engineering Tools: Use of Spanners, Pliers, Screw Drivers, Allen Keys and Punches.
2. Fitting: fitting tools, fitting operations & joints, Models involving rectangular, triangular, semi-circular and dovetail joints. (Only one model)
3. Welding – Arc welding: study of electric arc welding tools and equipment, Models involving Butt joint, Lap joint, T-joint and L-joint
4. Sheet metal: Development of surfaces for making simple objects like cylinder cone, tray, etc.
5. Basic functional study and application of Power Tools to include operations like drilling, tapping & fastening of screws to assemble mechanical components.
6. Basic functional study and application of simple electrical circuits involving use of different switches (one-way, two-way, etc), lamps in series and parallel configurations, electrical buzzer, tube lights and fuses.
7. Basic study on causes of fire, fire triangle, fuel classification, different fire extinguishers, rules for fire extinguishing and demonstration of extinguishing the fire using fire extinguishers.

Introduction to Engineering Design (2-0-0)

Sub Code: AD0201 CIE: 50 % Marks
Hrs / Week: 02 SEE: 50 % Marks
SEE Hrs: 02 Max. Marks: 50

Course outcomes

Upon successful completion of this course, the student will beable to:

1. Recognize the roles and responsibilities of an engineer
2. Define engineering design problem and product specifications
3. Generate concepts, evaluate and select for detailed design
4. Determine materials and processes and to be able to model for analysis.
5. Develop detailed design and drawings, estimate the cost and carry out performance evaluation.
6. Prepare design reports and demonstrate project management skills.

UNIT – 1:

Introduction: Definition of Engineering and Engineer, roles and responsibilities of an engineer, characteristics of a successful engineer, Personal and professional ethics, Engineering ethics decision matrix.

Engineering analysis and system of units: Engineering analysis, variables, units of measurement, The SI unit system, Force, weight and mass,

SLE : Significant figures 4 Hours

UNIT – 2:

Introduction to Engineering Design: Definition, Design process, Design interfaces, steps in the Engineering Design, General example.

Problem Definition: Introduction, Need identification, Sources of information, Patent literature, Production design specification (PDS), PDS criteria, Content of a PDS, Sample PDS.

SLE: Codes and standards 4 Hours

UNIT – 3:Creativity and Concept generation: Introduction, Psychological Set, Inversion, analogy, brainstorming, morphological analysis, Presentation of concepts: concept sketches.

Concept Evaluation and Selection: Introduction, Subjective decision-making, Criteria ranking, criteria weighting, Datum method (Pugh Matrix),

SLE: Binary dominance matrix method of concept evaluation 5 Hours

UNIT – 4:

Embodiment Design: Introduction, Size and strength, Scheme drawing, Form Design, Provisional materials and process determination, Design for assembly and manufacture, Design for robustness.

Modeling and Analysis: Introduction, Mathematical modeling and analysis, Two dimensional and Three dimensional models, Simulation

SLE: Industrial design: Ergonomics and aesthetics. 5 Hours

UNIT – 5:

Detail Design

Factor of safety, Selection of materials and bought out components, Detailed drawings. Cost estimation.

Manufacture and Testing: Different manufacturing processes, Prototypes, Performance testing.

SLE: Rapid prototyping 4 Hours

UNIT – 6:

Design report: Introduction, organization of the report, report writing guidelines, Concept sketches, Scheme Drawing.

Design Management: Introduction, Management of design for quality, Project planning and control, Quality function deployment, Design review.

SLE: Value analysis 4 Hours

Text Books:

1. Engineering Design Principles by Kenneth Hurst, Elsevier, Indian reprint ISBN 978-93-80501-35-2, 2010.

2. Exploring Engineering- An Introduction to Engineering and Design, Philip Kosky, George Wise, Robert Balmer, William Keat, Academic press, Elsevier, Indian reprint ISBN 978-93-80501-33-8, 2nd edition, 2010.

Reference Books:

1. Engineering Design by George Deiter, Mc- Graw Hill international, 2000.

2. Product Design and Development by Carl. T Ulrich, Steven Eppinger and Anita Goel, ISBN 978-00-701`46-79-2, Tata Mc-Graw Hill.

KANNADA KALI

KA0001 (MANDATORY LEARING COURSE)

Lesson 1 : Introducing each other – 1.

Personal Pronouns, Possessive forms, Interrogative words.

Lesson 2 : Introducing each other – 2.

Personal Pronouns, Possessive forms, Yes/No Type

Interrogation

Lesson 3 : About Ramyana.

Possessive forms of nouns, dubitive question, Relative nouns

Lesson 4 : Enquiring about a room for rent.

Qualitative and quantitative adjectives.

Lesson 5 : Enquiring about the college.

Predicative forms, locative case.

Lesson 6 : In a hotel

Dative case defective verbs.

Lesson 7 : Vegetable market.

Numeral, plurals.

Lesson 8 : Planning for a picnic.

Imperative, Permissive, hortative.

Lesson 9 : Conversation between Doctor and the patient.

Verb- iru, negation – illa, non – pasttense.

Lesson 10: Doctors advise to Patient.

Potential forms, no – past continuous.

Lesson 11: Discussing about a film.

Past tense, negation.

Lesson 12: About Brindavan Garden.

Past tense negation.

Lesson 13: About routine activities of a student.

Verbal Participle, reflexive form, negation.

Lesson 14: Telephone conversation.

Past and present perfect past continuous and their negation.

Lesson 15: About Halebid, Belur.

Relative participle, negation.

Lesson 16: Discussing about examination and future plan.

Simple conditional and negative

Lesson 17: Karnataka (Lesson for reading)

Lesson 18: Kannada Bhaashe (Lesson for reading)

Lesson 19: ManataruvaSangatialla (Lesson for reading)

Lesson 20: BekuBedagalu (lesson for reading)

Engineering Chemistry

Sub Code : CH0401 **CIE: 50% Marks**
Hrs/Week : 04 **SEE: 50% Marks**
SEE Hrs : 3 Hrs **Max Marks: 100**

COURSE OUTCOME:

On successful completion of the course, the students will be able to,

1. Explain the basic concept of batteries & fuel cells and their applications.
2. Apply the knowledge in corrosion science to control corrosion problems.
3. i. Demonstrate the metal finishing through electro/electroless plating techniques.
   ii. Understand the importance of various analytical instruments in chemical analysis.
4. i. Identify various methods to enhance the quantity & quality of gasoline.
   ii. Understand solar energy as a substitute to conventional energy sources.
5. Apply the knowledge of different methods for water analysis and purification.
6. Explain the processing of high polymers & their applications.

UNIT-1

Battery Technology

Introduction - Galvanic cell, electrode potential, EMF of the cell and cell representation. Batteries and their importance, Classification of batteries- primary, secondary and reserve batteries with examples. Battery characteristics - voltage, capacity, energy density, power density, energy efficiency, cycle life and shelf life. Basic requirements for commercial cells. Construction, working and applications of: Dry cell, lead-acid battery, Ni-Cd battery, Zn-air battery. Li-MnO_2 battery, Fuel Cells- Differences between battery and a fuel cell, classification of fuel cells -based on type of fuel, electrolyte and temperature. Construction, working and applications of Solid oxide fuel cell (Yttria stabilized zirconia electrolyte)

SLE: Construction, working and applications of H_2–O_2 Fuel cell.

8 Hrs

UNIT-2

Corrosion and its Control

Introduction, Electrochemical theory of corrosion- formation of tiny galvanic cells, oxidation reaction, reduction reactions (acidic, alkaline/neutral medium), ex: - rusting of iron. Factors influencing the corrosion rate: physical state of the metal, nature of the metal, area effect, over voltage, pH, temperature and nature of the corrosion product. Types of corrosion: (i) Differential metal corrosion- explanation with an example, galvanic series; (ii) Differential aeration corrosion- oxygen concentration cell, pitting corrosion; (iii) Stress corrosion- explanation- caustic embrittlement. Corrosion control by: i) Using inhibitors, ii) Cathodic protection- sacrificial anode method and iii) Protective coatings-metal coatings- galvanizing and tinning.

SLE: Cathodic protection by impressed current method.

8 Hrs

UNIT-3

Metal finishing

Definition, Technological importance-corrosion resistance, physical and mechanical properties, electroforming, electropolishing, electrochemical etching. Electroplating-explanation, Factors affecting the nature of deposit- current density, pH, temperature, complexing agents, organic additives & throwing power of a plating bath.. Electroplating of nickel using Watt's bath and its applications. Electroless plating- explanation, composition of the bath, advantages, electroless plating of copper on PCB.

SLE: Surface preparation- solvent cleaning, alkali cleaning, mechanical cleaning and pickling.

5 Hrs

Instrumental Methods of analysis

Types of instrumental analysis, Electroanalytical techniques: i) Conductometry- principle, Estimation of HCl using standard NaOH, applications of conductometric titrations(acid- base titrations only), ii) Potentiometry- principle and applications- a. Potentiometric estimation of iron, b. Determination of dissociation constant of a weak electrolyte using glass electrode (Construction and expression for E_g) and secondary reference electrode - construction and working of calomel electrode. Spectroscopic method - Colorimetry - Laws of absorbance, determination of λ_{max} and colorimetric estimation of copper.

SLE: Construction and working of Silver-Silver chloride electrode.

5 Hrs

UNIT-4

Chemical fuels

Introduction, classification with examples, calorific value-classification (HCV & LCV), determination of calorific value of solid and liquid fuels using Bomb calorimeter-numerical problems. Petroleum cracking -fluidised bed catalytic cracking. Reformation of petrol-explanation with reactions, octane number, cetane number, Knocking in IC engine. Synthetic petrol - Fischer-tropsch process. Power alcohol-advantages.

Solar energy- Photo voltaic cells- definition, working and importance of PV cells. Production of solar grade silicon by chemical vapor deposition method and purification by zone refining technique.

SLE: Prevention of knocking: Anti-knocking agent & unleaded petrol.

8 Hrs

UNIT-5

Water technology

Introduction, sources, impurities, water analysis: i. Hardness-determination by EDTA method-numerical problems, ii. Alkalinity-determination by double indicator method-numerical problems, iii. Determination of chloride by Mohr's method, iv. Determination of fluoride by colorimetric method (SPADNS method), v. Determination of dissolved oxygen by Winkler's method and vi. Determination of chemical oxygen demand - numerical problems on COD. Boiler scales-formation and ill effects, prevention of scales by external method (hot lime-soda process), Desalination by electrodialysis and reverse osmosis methods. Sewage treatment- primary, secondary treatment by activated sludge process and tertiary treatment.

SLE: Prevention of scales by internal methods (Calgon and Phosphate conditioning).

10 Hrs

UNIT-6

High polymers

Introduction, classification - natural and synthetic polymers with examples. Methods of polymerization - bulk, solution, suspension and emulsion polymerization. Preparation, properties and applications of Plexi glass (PMMA), Polyurethane, and Epoxy resin; Determination of molecular weight of polymers by number average and weight average method-numerical problems. Glass transition temperature (T_g)-meaning - factors affecting T_g (crystallinity, effect of side groups, molecular weight & plasticizers) and significance. Conducting polymers - mechanism of conduction in polyacetylene and applications.

SLE: Addition and Condensation polymerization, Preparation, properties & applications of Teflon and Bakelite.

8 Hrs

(Note: SLE – Self Learning Exercise)

Text Books

1. A text book of Engineering Chemistry 15th Edition by P.C.Jain and Monica Jain, Dhanpat Rai Publishing Co (P) Ltd., New Delhi.
2. Text book of Engineering Chemistry by Dr. K. Pushpalatha, published by Wiley publications 2nd edition.
3. Text book of Engineering Chemistry by S.S. Dara, published by Chand and Co., 2009.

Reference Books

1. Principles of Physical Chemistry by B.R.Puri, L.R.Sharma and M.S.Pathania, S. Nagin Chand and Co.
2. Text book of Physical Chemistry by Soni and Dharmatha, S.Chand & Sons.
3. Text book of Polymers science by Gowarikar and Vishwanathan.
4. Corrosion Engineering by M.G.Fontana, Mc Graw Hill Publications.

COMPUTER CONCEPTS AND 'C' PROGRAMMING (4:0:0)

Sub code	**: CS0401**	**CIE**	**: 50% Marks**
Hrs/week	**: 04**	**SEE**	**: 50% Marks**
SEE Hrs	**: 03 Hours**	**Max. Marks: 100**	

Course Outcomes:
On successful completion of the course, the students will be able to

1. Identify the various terminologies and basic interaction methods in the computers
2. Describe the basic methods of storing and processing data and also the role of operating systems and networking.
3. Analyse problems and convert them to flowcharts & algorithms.
4. Illustrate the concepts of operators, decision making and branching.
5. Demonstrate the use of arrays & structures.
6. Implement user defined functions, pointers & File management.

UNIT – 1

Introducing Computer Systems:
The Computer defined, Computers for individual users, Computers for organizations, The parts of a computer system, The information processing cycle, Essential computer hardware.
Interacting with Computer:
The Keyboard – The Standard Keyboard Layout, The Mouse, Inputting data in other ways – Devices for the hand, Optical Input Devices and Audiovisual Input Devices. Video and Sound – Monitors-CRT, Flat-Panel monitors, Printing – Commonly used printers - Dot Matrix Printers, Ink Jet Printers, and Laser Printers.

SLE: Identification of latest printers and its features. **9 Hrs**

UNIT – 2

Processing Data:
Transforming Data into Information: How computers represent data?, How computers process data?, Factors affecting processing speed.

Storing Data: Magnetic Storage Devices- How data is stored?, How data is organized on a disk?, Solid-State storage devices- Flash memory and smart card.

Using Operating Systems:
Operating system basics – The purpose of operating system, Types of Operating System, Providing a User Interface-GUI and Command Line Interface, List of Operating Systems used in Personal Computers and Network Servers.

Networks and the Internet:
Networking basics - The uses of a network, Common types of networks, Introduction to Internet, Internet's major services, WWW, E-mail.

SLE: Importance of Android OS, Examples of Magnetics and optical storage devices.

9 Hrs

UNIT – 3

Algorithms and Flowcharts:
Algorithms, Flowcharts, Writing algorithms and drawing flowcharts for simple exercises.

Introduction to C

Constants, Variables, and Data types:
Structure of C, Characters set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables.

Operators and Expressions:
Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and decrement operators, conditional operator**,** Bitwise operators, Special operators, Arithmetic expressions, Evaluation of expressions, Precedence of Arithmetic operators, Type conversions in expressions, Operator precedence and associativity.

SLE: Identification of latest browsers used in different devices (computer and mobile).

9 Hrs

UNIT – 4

Managing Input and Output Operations:
Reading a character, Writing a character, Formatted Input, Formatted Output.

Decision making and Branching:
Decision making with if statement, Simple if statement, The if…else statement, Nesting of if…else

statements, The else … if ladder, The switch statement, the?: operator, The Goto statement

Decision making and Looping:
The while statement, the do statement, the For statement, Jumps in Loops.

SLE: Writing Set of Programs on above concept.

9 Hrs

UNIT – 5

Arrays:
One-dimensional Arrays, Declaration of one-dimensional Arrays, Initialization of one-dimensional Arrays, Two-dimensional Arrays, Initializing two-dimensional Arrays

Strings:
Introduction to Strings, Declaring and initializing, Reading a String, Writing a String, String Functions (strcat, strcpy, strcmp, strrev, strlen)

Structures:
Defining a Structure, Declaring Structure Variables, Accessing Structure Variables, Structure Initialization.

SLC: List applications of arrays and structures. Writing Programs on above concept. **8 Hrs**

UNIT – 6

User-defined Functions:
Need for User-defined Functions, A multi-function Program, Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Parameter Passing technique-call by value and call by reference, Category of Functions.

Pointers:
Understanding Pointers, Accessing the Address of a Variable, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a variable through a Pointer.

File Management in C:
Introduction, Defining and Opening a File, Closing File & Input/output operations on Files.

SLE: Programs on I/O operations on files, applications of pointers. **8 Hrs**

TEXT BOOKS:

1. **Introduction to Computers**, Peter Norton, 6th Edition.
2. **Programming in ANSI C,** E Balaguruswamy, 3rd Edition.

REFERENCE BOOKS:

1. **Introduction to Computer Science,** ITL Education Solutions Ltd.
2. **Fundamentals of Computers,** V Rajaraman, 4th Edition.
3. **Programming Techniques through 'C',** M G V Murthy.
4. **The C programming language,** Brian w. Kernighan,Dennis Ritchie 2nd edition

Electronics Fundamentals (4:0:0)

Sub. Code: EC0401 **CIE: 50% Marks**
Hrs/Week: 4 **SEE: 50% Marks**
SEE Hrs: 3 Hrs **Max. Marks: 100**

Course Outcome:

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

1. Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and its characteristics and to analyze and design different transistor biasing circuits
2. Apply the concept of stabilization technique, biasing, coupling and feedback of transistors to explain the working of amplifiers and oscillators.
3. Solve problems of various digital logic gates and circuits.
4. Describe the concept of various communication systems and its applications.
5. Correlate the fundamental concepts to various Real life applications of today.

Unit 1: Semiconductor Diodes and Applications

p-n junction diode, Characteristics and Parameters, Diode approximations, Zener diodes, Half-wave diode rectifier, Ripple factor, Full-wave diode rectifier, Other full-wave circuits(Qualitative analysis only)Shunt capacitor - Approximate analysis of capacitor filters, Zener diode voltage regulators, Numerical examples as applicable **8 Hrs**

SLE: Simple Regulated power supply

Unit 2: Transistors

Bipolar Junction transistor, Transistor Voltages and currents, amplification, Common Base, Common Emitter Characteristics, DC Load line and Q Point, Biasing methods, Voltage divider Bias, Operating point, Note on stability, Numerical examples as applicable.

8 Hrs

SLE: Common Collector Characteristics, Bias compensation for V_{BE} and I_{CO}.

Unit 3: Amplifiers

Introduction to Amplifiers, Transistor as an Amplifier – Graphical Analysis, Cascading of amplifiers, types of coupling, RC coupled amplifier and its frequency response, Numerical examples as applicable.

8 Hrs

SLE: Overview of design of RC coupled Amplifier.

Unit 4: Oscillators

Introduction to Feedback in amplifiers, Expression for Transfer gain, Advantages of Negative Feedback, Barkhausen Criterion, RC Oscillator, LC Oscillator, Crystal Oscillator, Numerical examples as applicable **7 Hrs**

Introduction to Digital Electronics

Number systems and their inter conversions, Binary Addition and Subtraction, logic gates, Boolean algebra, Half-Adder, Full-Adder and Parallel Binary Adder, Numerical examples as applicable.

7Hrs

SLE: Addition and subtraction in other number systems.

Unit 5: Communication Systems

Introduction to Communication System, Modulation, Analog Modulation Techniques, Super heterodyne Receivers, CRO operation and Applications, Numerical examples as applicable.

7 Hrs

SLE: Signal Generator.

Unit 6: Devices & Media

Cellular & Mobile Applications, UPS, Display Devices, Basics of Multimedia signal representation.

6 Hrs

SLE: Touch Screen and its applications.

Text Books:

1. **"Electronic Devices and Circuits Theory", '**Robert L Boylestad', PHI, 6th Edition.
2. **"Electronic Devices and Circuits",** S. Salivahanan, Tata McGraw-Hill, 2nd Edition, 2008.
3. **"Basic Electronics",** D.P. Kothari, I. J. Nagrath, McGraw Hill Education (India) Private Limited, 2014.

Reference Book:

1) **"Electronic Devices and Circuits",** David. A. Bell, PHI, New Delhi, 2004.
2) '**Multimedia Communications: Applications, Networks, Protocols and Standards'**, 'Fred Halsall', Pearson Education, Asia, Second Indian reprint 2002.
3) **'Wireless Cellular Communications'**, 'Sanjay Sharma', KATSON books, 2nd Edition 2007.

Computer Aided Engineering Drawing (2-0-4)

Sub Code : ME0402	**CIE: 50%Marks**
Hrs / Week : 04	**SEE: 50% Mark**
SEE Hrs : 3 Hrs	**Max. Marks: 100**

Course Outcomes:

At the end of this course, successful students will be able to:

1. Use all drawing instruments & software commands to construct basic Geometric sketches.
2. Demonstrate the concepts of Orthographic Projections of Points & Lines.
3. Draw projections of regular plane surfaces.
4. Draw projections of right & regular solids
5. Prepare developments of solids
6. Illustrate isometric projections & views of solids & combinations of solids

Unit 1:

Introduction to Computer Aided Sketching: Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Introduction to Solid Edge standard tool bar/menus .Co-ordinate system, points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning conventions.

04 Hours

Unit 2:

Orthographic Projections: Projections of points, Projections of straight lines (First Angle Projection), True and apparent lengths.

10 Hours

Unit 3:

Orthographic Projections of Plane Surfaces: Projections of plane surfaces.

08 Hours

Unit 4:

Projections of Solids: Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions.

12 Hours

Unit 5:

Development of Surfaces: Representation of section planes & section points, Development of lateral surface of Pyramids, Cylinders and Cones.

10 Hours

Unit 6:

Isometric Projection: Isometric scale, projection of plane figures, solids: tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, truncated solids, combinations.

08 Hours

Text Books :

1. Engineering Drawing by N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat.
2. Engineering Graphics by K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.

Reference Books:

1. A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.
2. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- by Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice Hall of India Pvt. Ltd., New Delhi.

ENGINEERING CHEMISTRY LAB

Sub Code : CH0101 **Hrs/Week: 03 Hrs**
Max Marks : 50

COURSE OUTCOME:

On successful completion of the course, the students will be able to,

1. Perform chemical analysis quantitatively and analyse the data to arrive at a conclusion.

PART-A

1. Estimation of total hardness in water by EDTA method.
2. Estimation of sodium thiosulphate by Iodometric method.
3. Estimation of percentage of copper in brass.
4. Estimation of Iron in the Hematite ore by external indicator method.
5. Determination of Chemical Oxygen Demand (COD) of the given industrial waste water sample.
6. Determination of Calcium Oxide (CaO) in the given sample of cement by Rapid EDTA method.

PART-B

1. Estimation of Mohr's salt by Potentiometric titration.
2. Estimation of an acid (weak/strong) by Conductometric titration.
3. Determination of pKa of a weak acid using pH meter.
4. Estimation of copper by using Colorimeter.
5. Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6. Estimation of Iron by using Colorimeter.

(Note: Any ten experiments may be conducted)

Reference Books

Vogels textbook of quantitative inorganic analysis, revised by J.Bassett, R.C.Denny, G.H.Jeffery, 4th Ed.

COMPUTER PROGRAMMING LABORATORY (0:0:3)

Sub code : CS0101 **Max. Marks: 50**
Hrs/week : 03

On Successful completion of this course, the students will be able to

1. Demonstrate the hardware components, DOS commands, mechanics of creating a Word document, the use of basic functions and formulas in Microsoft Excel and the basic mechanics of creating a PowerPoint presentation.
2. Apply and practice logical ability to solve the problems.
3. Understand C programming development environment, compiling, debugging, linking and executing a program using the development environment.
4. Analyzing the complexity of problems, modularize the problems into small modules and then convert them into programs.
5. Understand and apply the in-built functions and customized functions for solving the problems.
6. Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

PART – A

1 a. Identify the hardware components of a computer
b. Execute basic DOS commands.

2. Create a document using a suitable word processing package, with at least three paragraphs and perform the following operations:

I. Set left margin 1" and right margin 0.75"
II. Centre the heading and make it bold. Increase the font size
III. Underline the specified words in the document and change them to italics
IV. Conduct s-pell check and correct them suitably
V. Demonstrate use of numbering and bullets
VI. Exchange paragraphs 2 and 3 using cut and paste facility
VII. Put suitable headers and footers
VIII. Count the number of words and lines and demonstrate the use of drawing tools
IX. Include suitable logo/emblem/symbol
X. Include a table

3. Generate pay slip for different categories of employees (example: manager, assistant manager, supervisor, clerk etc) using spreadsheet which includes Basicpay, DA, HRA and other allowances along with deductions like PF, Professional Tax, and other deductions. DA and HRA are calculated in terms of percentage which keeps varying. Use formula while performing calculations. Each column and row should display total. Sort the name list in ascending order. Draw the bar chart to describe the DA percentage for different types of employees.

4. Create a PowerPoint presentation consisting of
Master slide generation
Minimum 8 slides
Information about your college
Include animation, Hyperlinks, Insert Header and Footer, Insert files, images, tables and Charts. Slide show features .

5. Write a C program to find and output all the roots of a given quadratic equation, for non-zero coefficients. (Using *if...else* statement)

6. Write a C program to simulate a simple calculator that performs arithmetic operations like addition, subtraction, multiplication, and division only on integers. Error message should be reported, if any attempt is made to divide by zero. (Using *switch* statement)

7. Write a C program to reverse a given six digit integer number and check whether it is a palindrome or not. Output the given number with suitable message. (Using *While* statement)

8. Write a C program to generate and print first 'N' Fibonacci numbers. (Using *do-While* statement)

9. Write a C program to find the GCD and LCM of two integers and output the results along with the given integers. Use Euclid's algorithm. (Using looping constructs)

10. Write a C program to find whether a given number is prime or not. Output the given number with suitable message. (Using *for* statement)

PART – B

11. Write a C program to input N real numbers in ascending order into a single dimension array. Conduct a binary search for a given key integer number and report success or failure in the form of a suitable message.

12. Write a C program to input N integer numbers into a single dimension array. Sort them in ascending order using bubble sort technique. Print both the given array and the sorted array with suitable headings.

13. Write a C program to read two matrices A(M x N) and B(P x Q) and perform addition. Output the input matrices and the resultant matrix with suitable headings and format. (Using two dimension arrays where array size M, N, P,Q $\leq$ 3)

14. Write C user defined functions:
    3. To input N integer numbers into a single dimension array.
    4. To conduct a linear search.

    Using these functions, write a C program to accept the N integer numbers & given key integer number and conduct a linear search. Report success or failure in the form of a suitable message.

15. Write C user defined functions:
    - To input N integer numbers into a single dimension array.
    - To sort the integer numbers in descending order using selection sort technique.
    - To print the single dimension array elements.

    Using these functions, write a C program to input N integer numbers into a single dimension array, sort them in descending order, and print both the given array & the sorted array with suitable headings.

16. Write C user defined functions:
    To input N real numbers into a single dimension array.
    Compute their mean.
    Compute their variance
    Compute their standard deviation.

    Using these functions, write a C program to input N real numbers into a single dimension array, and compute their mean, variance & standard deviation. Output the computed results with suitable headings.

17. Write a C-program that reads a string from keyboard and determines whether the string is a palindrome or not using:

a. String functions

b. user-defined functions (without C-library functions)

18. Write C user defined functions:

- To read the elements of a given matrix of size M x N
- To print the elements of a given matrix of size M x N
- To compute the product of two matrices

Using these functions, write a C program to read two matrices A (M x N) and B (P x Q) and compute the product of A and B after checking compatibility for multiplication. Output the input matrices and the resultant matrix with suitable headings and format. (Using two dimension arrays where array size M, N, P, Q $\leq$ 3)

19 **a.** Write a C program to create an integer variable, Assign value to the variable, create a pointer to this variable and print the value of the variable and address of the variable using pointer.

b. Write a C program to create a structure called Employee with members Name, Job, Salary. Create a structure variable. Accept the input values for the structure members at run time. Suitably display the same.

20. Write a C program to create a C file called student. rec and store information about a student, in terms of his NAME, USN, BRANCH, and SEMESTER. Read the stored contents from the file and display on the screen.

ENGLISH ENHANCEMENT COURSE

Sub code: HS0201	**CIE : 50% Marks**
Hrs/Week: 2 Hrs.	**SEE : 50% Marks**
SEE Hrs: 2 Hrs.	**Max. Marks : 50**

Course Prerequisites :

None

Course Outcomes :

Upon successful completion of this course, the student will be able to:

1. Understand, identify, analyse and apply the concepts for effective communication and give a good introduction for effective presentations
2. Hone listening skills and be able to interpret different accents, follow the directions given and work accordingly
3. Learn to send written messages appropriately
4. Seek information from various sources, assimilate, and voice their opinion effectively
5. Design and deliver a good presentation

Course Content :

Unit I : **4 Hours** : STAR

- S-T-A-R : (Speak – Transcribe – Analyse - Record)

Unit II : 10 Hours : Communication and Grammar

- Basics of communication, its barriers, preparing a good introduction, using comprehensible accent and using proper grammar
- Grammar concepts through common errors

Unit III: 2 hours

- Listening skills : listen to different accents and directions. Alternately – Recollect from the visual words, speech and visuals. Face to face and back to back communication
- Email etiquette, conveying messages like acceptance or rejection of job offers, Requesting information of a product or service or follow ups to earlier correspondence, agreement and disagreement etc

Unit IV : 10 hours : Group Discussion and Seminar

Group Discussion – Seek information on the given topic, assimilate and present / share opinions, facts, ideas etc within the given parameters. Topics will pertain to current issues for eg. Occupational disease and role of engineers to combat it (shop floor, operations area, silicosis etc), Elections in India – the new circus, Does India enjoy demographic advantage given its youth population, Start ups – the new employment agency

TEXT BOOKS :

1. A Mirror of Common Errors by Ashok Kumar Singh, Publisher – Students' Friends
2. English Grammar by Wren and Martin

REFERENCES :

1. King's English – The first encyclopedia of English Language, Publishers – Addone
2. Internet sources

Note:

Handouts, Questionnaires and materials will be provided

ENGINEERING MATHEMATICS – II (4:0:0)

(Common to all branches)

Sub Code :	**MA0402**		**CIE : 50% Marks**
Hrs/Week :	**04**		**SEE : 50% Marks**
SEE Hrs :	**03**	**Total Hrs : 52 Hrs**	**Max. Marks : 100**

Course Outcomes:

On successful completion of the course the students will be able to:

1. Solve linear second and higher order differential equations with constant coefficients and apply these techniques to compute the solution of differential equation arising from LRC circuit, motion of mass spring.

2. Solve linear second order differential equations with constant and variable coefficients and compute the series solution of differential equations.
3. Apply double integral to compute area, surface area and use triple integral to compute volume. Solve certain improper integrals using Beta-Gamma functions.
4. Operate vector differential operator 'del' on vector and scalar point functions and compute vector line integral using Green's, Stokes and Gauss divergence theorems.
5. Compute Laplace transform of periodic and certain special type of functions.
6. Compute Inverse Laplace transform of functions and use it to solve ordinary and simultaneous differential equations with initial and boundary conditions.

Unit – I **Differential Equations - 1**

Linear differential equations of second and higher order with constant coefficients by inverse operator method, (SLE: particular integral for the functions of the type $x^n\sin ax/x^n\cos ax$) Applications - initial and boundary value problems.

9 hrs

Unit – II **Differential Equations - 2**

Legendre's differential equation (SLE: Cauchy's differential equation). Method of variation of parameters. Series solution of differential equations .

8 hrs

Unit – III **Integral Calculus**

Multiple integrals – evaluation of double and triple integrals. evaluation of double integrals over a region (SLE: evaluation by changing into polar form) Change of order of integration. Applications. Beta and Gamma functions – properties and problems.

9 hrs

Unit – IV **Vector Calculus**

Vector differentiation – (SLE: components of velocity and acceleration, div(curl A), curl(gradϕ)) Gradient, Divergence, Curl, Laplacian and their physical meanings. Solenoidal and Irrotational vectors - statement problems. Vector identities: curl(curl A) and div(A x B). Vector Integration – Vector line integral. Green's theorem, Stoke's theorem, Gauss divergence theorem (without proof) – problems only.

9 hrs

Unit – V **Laplace Transforms – 1**

Laplace transform of standard functions, (SLE: Laplace transforms of discontinuous functions) standard properties, Periodic functions, Unit step function, Unit impulse function.

9 hrs

Unit – VI **Laplace Transforms – 2**

Inverse Laplace transforms, Convolution theorem(without proof), solution of differential equations, simultaneous differential equations (SLE: Applications to engineering problems).

8 hrs

Text Books :

1. Higher Engineering Mathematics – Dr. B.S. Grewal, 42nd edition, Khanna Publications.
2. Advanced Engineering Mathematics – Erwin Kreyszig, vol I & II, wiley publications, 10th edition.

Reference Books :

1. Advanced Engg. Mathematics – H. K. Dass, Chand Publications.
2. Higher Engg. Mathematics – B. V. Ramanna, Tata McGraw-Hill Publications.
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