BASAVESHWAR ENGINEERING COLLEGE (Autonomous)
BAGALKOT - 587103
[Permanently affiliated to Visvesvaraya Technological University, Belagavi - 590 018, Approved by AICTE, Accredited by NBA and NAAC, Secured 191 Rank by NIRF, MHRD, New Delhi]

BVVS

SYLLABUS

for

I & II Semester B.E. Programme

2019-2020

Vision

To be recognized as a premier technical institute committed to developing exemplary professionals, offering research based innovative solutions and inspiring inventions for holistic socio economic development.

Mission

- To pursue excellence through student centric dynamic teaching-learning processes, encouraging freedom of inquiry and openness to change
- To carry out innovative cutting-edge research and transfer technology for industrial and societal needs
- To imbibe moral and ethical values and develop compassionate, humane professionals

SCHEME OF TEACHING AND EXAMINATION
B.E. I SEMESTER
2019-20

PHYSICS GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	UMA161C	Engineering Mathematics -I	4.0	3	2	-	50	50	100
2	UPH162C	Engineering Physics	4.0	3	2	-	50	50	100
3	UME163C	Elements of Mechanical Engineering	3.0	2	2	-	50	50	100
4	UEE164C	Basic Electrical Engineering	3.0	2	2	-	50	50	100
5	UCS165C	Programming with C	3.0	3	-	-	50	50	100
6	UHS126M	Constitution of India*	-	2	-	-	50	50	100
7	UPH166L	Engineering Physics Laboratory	1.5	-	-	3	50	50	100
8	UCS167L	C Programming Laboratory	1.5	-	-	3	50	50	100
		Total	**20**	**15**	**8**	**6**	**400**	**400**	**800**

* Mandatary subject,Question paper will be of objective type. Students have to pass the subject compulsorily, however marks will not be considered for awarding Grade/Class/Rank.

SCHEME OF TEACHING AND EXAMINATION
B.E. I SEMESTER
2019-20

CHEMISTRY GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	UMA161C	Engineering Mathematics -I	4.0	3	2	-	50	50	100
2	UCH168C	Engineering Chemistry	4.0	3	2	-	50	50	100
3	UEC169C	Basic Electronics	3.0	2	2	-	50	50	100
4	UCV170C	Engineering Mechanics	3.0	2	2	-	50	50	100
5	UBT133M	Environmental Studies*	-	2	-	-	50	50	100
6	UME171L	Computer Aided Engineering Graphics	2.5	1	-	3	50	50	100
7	UCH172L	Engineering Chemistry Laboratory	1.5	-	-	3	50	50	100
8	UBE173L	Basic Engineering Laboratory	2.0	-	-	4	100	-	100
9	UHS174K	English for Engineers	-	2	-	-	-	-	-
		Total	**20**	**15**	**08**	**10**	**450**	**350**	**800**

* Mandatary subject,Question paper will be of objective type. Students have to pass the subject compulsorily, however marks will not be considered for awarding Grade/Class/Rank.

SCHEME OF TEACHING AND EXAMINATION
B.E. II SEMESTER
2019-20

PHYSICS GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	UMA261C	Engineering Mathematics -II	4.0	3	2	-	50	50	100
2	UPH262C	Engineering Physics	4.0	3	2	-	50	50	100
3	UME263C	Elements of Mechanical Engineering	3.0	2	2	-	50	50	100
4	UEE264C	Basic Electrical Engineering	3.0	2	2	-	50	50	100
5	UCS265C	Programming with C	3.0	3	-	-	50	50	100
6	UHS226M	Constitution of India*	-	2	-	-	50	50	100
7	UPH266L	Engineering Physics Laboratory	1.5	-	-	3	50	50	100
8	UCS267L	C Programming Laboratory	1.5	-	-	3	50	50	100
		Total	**20**	**15**	**8**	**6**	**400**	**400**	**800**

* Mandatary subject,Question paper will be of objective type. Students have to pass the subject compulsorily, however marks will not be considered for awarding Grade/Class/Rank.

SCHEME OF TEACHING AND EXAMINATION
B.E. II SEMESTER
2019-20

CHEMISTRY GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	UMA261C	Engineering Mathematics -II	4.0	3	2	-	50	50	100
2	UCH268C	Engineering Chemistry	4.0	3	2	-	50	50	100
3	UEC269C	Basic Electronics	3.0	2	2	-	50	50	100
4	UCV270C	Engineering Mechanics	3.0	2	2	-	50	50	100
5	UBT233M	Environmental Studies*	-	2	-	-	50	50	100
6	UME271L	Computer Aided Engineering Graphics	2.5	1	-	3	50	50	100
7	UCH272L	Engineering Chemistry Laboratory	1.5	-	-	3	50	50	100
8	UBE273L	Basic Engineering Laboratory	2.0	-	-	4	100	-	100
9	UHS274K	English for Engineers	-	2	-	-	-	-	-
		Total	**20**	**15**	**08**	**10**	**450**	**350**	**800**

* Mandatary subject,Question paper will be of objective type. Students have to pass the subject compulsorily, however marks will not be considered for awarding Grade/Class/Rank.

UMA161C: ENGINEERING MATHEMATICS-I
(CALCULUS)
4 Credits (3-2-0)

UNIT-I

Differential Calculus-1: **L-10 Hours, T-06 Hours**

Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian, parametric and polar forms (without proof) Taylor's and Maclaurin's series expansions for one variable (statements only) problems.

UNIT-II

Differential Calculus-2: **L-10 Hours, T-08 Hours**

Introduction to function of several variables, Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables and its applications; Method of Lagrange multipliers with one subsidiary condition, Jacobians-problems, Errors and approximations.

UNIT-III

Integral Calculus: **L-10 Hours, T-06 Hours**

Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals-change of order of integration and changing into polar, spherical and cylindrical co-ordinates. Applications to find area & volumes.

Beta and Gamma functions: Definitions, relation between Beta and Gamma functions-problems.

UNIT-IV

Vector Calculus: **L-10 Hours, T-06 Hours**

Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems

Vector Integration:

Line integrals, surface integrals and volume integrals. Green's theorem, Stoke's theorem, Gauss divergence theorem (without proof) - problems.

Total: L- 40 Hours, T-26 Hours

Text Books:

1. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 43rd edition, 2015.
2. E. Kreyszig, “Advanced Engineering Mathematics”, John Wiley & Sons, 10th edition, 2016.

Reference books:

1. James Stewart, “Calculus: Early Transcendentals”, Cengage Learning India, 2017.
2. C. Ray Wylie, Louis C.Barrett, “Advanced Engineering Mathematics", 6th edition, McGraw-Hill,1995.
3. B.V. Ramana, "Higher Engineering Mathematics", 11th edition, Tata McGraw-Hill, 2010.
4. N. P. Bali and Manish Goyal, “A Text Book of Engineering Mathematics”, Laxmi New Delhi 7th edition, 2010.
5. Gupta C. B., Singh S. R. and Mukesh Kumar, “Engineering Mathematics for Semester I & II”, McGraw-Hill, New Delhi, 2015.

Course Outcomes: On completion of this course, students are able to :

CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.

CO2: Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO3: Apply the concept of multiple integrals and their usage in computing the area and volumes.

CO4: Apply the knowledge of vector calculus to solve the engineering problems.

CO5: Exhibit the interdependence of line, surface and volume integrals.

Question paper pattern for SEE :

1. Total of **eight** questions with **two** from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** subdivisions.
3. Any **five** full questions are to be answered choosing at least **one** from each unit.

UPH162C: ENGINEERING PHYSICS
4 Credits (3-2-0)
(EC, EE, EI, CS AND IS BRANCHES)
UNIT I

Quantum Mechanics: **L- 10 Hours, T-6 Hours**

Introduction, Quantization of energy levels, Frank-Hertz experiment. de-Broglie hypothesis, phase velocity, group velocity. Relation between group velocity and particle velocity. Expression for de-Broglie wavelength using the concept of group velocity. Heisenberg's uncertainty principle and its physical significance (no derivation). Application of Heisenberg's uncertainty principle (non-existence of electron in the nucleus). Wave function, properties, probability density and normalization of a wave function. Setting up of a one dimensional time independent Schrodinger wave equation. Eigen functions and Eigen values. Application of Schrodinger wave equation- eigen function and energy eigen values of a particle in a one dimensional potential well of infinite height. Numerical problems.

Lasers:

Introduction, absorption, spontaneous emission and stimulated emission. Einstein's coefficients (expression for energy density). Conditions for laser action, requisites of a laser system, working mechanism of a laser. Characteristics of a laser. Classification of lasers. Construction and working of Nd:YAG, carbon dioxide and semiconductor diode lasers. Laser safety. Applications of lasers- industry, defense, medical and environmental. Numerical problems.

UNIT - II

L-10 Hours, T-6 Hours

Electrical Properties of Metals and Semiconductors:

Free electron concept (Drude-Lorentz theory). Classical free electron theory-assumptions. Derivation of electrical conductivity for metals. Effect of impurity and temperature on electrical resistivity of metals (Matthiessen's rule).Failures of classical free electron theory. Quantum free electron theory-assumptions. Fermi-Dirac statistics. Density of states (qualitative). Fermi energy, Fermi factor and variation of Fermi factor with energy for different temperatures. Derivation of Fermi energy for 0K. Merits of quantum free electron theory. Numerical problems.

Semiconductors, concentration of electrons and holes in intrinsic and extrinsic semiconductors (qualitative). Fermi level in intrinsic and extrinsic semiconductors (qualitative). Direct and indirect band gap semiconductors. Derivation of electrical conductivity for semiconductors. Hall effect, derivation of Hall voltage and Hall coefficient, experimental measurement of Hall voltage and Hall coefficient. Applications of Hall effect. Numerical problems.

Superconductivity:

Temperature dependence of resistance in conductors and superconductors. Introduction to diamagnetism (based on orbital velocity). Meissner effect, critical magnetic field, Type I and Type II superconductors. BCS theory (qualitative). Applications of superconductors–Maglev vehicles and SQUID. Numerical problems.

UNIT – III

Crystal Structure: **L-10 Hours, T-8 Hours**

Introduction, directions and planes in a crystal. Miller indices. Expression for interplanar spacing interms of Miller indices. Coordination number, atomic packing factor for SC, BCC, FCC and HCP. Relation between lattice constant and density of a material. Crystal structures of CsCl, NaCl and Diamond. Bragg's Law and Bragg's X-ray spectrometer-determination of wavelength. Determination of cubic crystal structures using diffractograms. Numerical problems.

Dielectric materials:

Polar and non-polar dielectrics, Dielectric polarization, polarization process in polar and non-polar dielectrics, polarization mechanisms. Dielectric constant (derivation), relation between polarization and dielectric constant. Internal field and derivation of internal field in solids and liquids (one dimensional). Clausius–Mossotti relation. Dielectric loss (derivation). Applications of dielectric materials. Numerical problems.

UNIT - IV

Electromagnetic waves: **L- 10 Hours, T-6 Hours**

Introduction, Scalar and Vector, Cartesian coordinate system, Spherical coordinate system, Cylindrical coordinate system. Coulomb's law, electric field intensity, electric potential at a point. Biot-Savarts law, Ampere's circuital law. Maxwell's four equations (qualitative). Wave propagation in free space. Application of EM waves – wireless communication. Numerical problems.

Optical fibers:

Introduction, propagation mechanism in optical fibers, angle of acceptance, numerical aperture and its derivation. Modes of propagation (qualitative), types of optical fibers and attenuation. Applications-optical fiber communication system, optical fiber as a sensor. Numerical problems.

Ultrasonic Waves:

Introduction, generation of ultrasonic waves (inverse piezoelectric method) and properties. Measurement of velocity of ultrasonic waves in solids and liquids. Applications of ultrasonic waves- non destructive testing of materials, medical and elastic constants of solids and liquids. Numerical problems.

Nanoscience:

Introduction, density of states in 1D, 2D and 3D structures. Nanomaterials,

synthesis: Top-down and Bottom-up approach - Ball Milling and Sol-Gel methods. CNT-types, electrical properties and applications. Numerical problems.

Total: L- 40 Hours, T-26 Hours

Text Books:

1. M.N.Avadhanulu and P.G.Kshirsagar, "A Textbook of Engineering Physics", Ninth edition, S. Chand, 2014.

Reference Books:

1. S.O.Pillai, "Solid State Physics", Sixth edition, New Age International, 2010.
2. R.K.Puri and V.K.Babbar, "Solid State Physics", S.Chand, 2010.
3. Arthur Beiser, "Concepts of Modern physics", Sixth edition, T.M.H, 2006.
4. B. B. Laud, "Lasers and Non-Linear Optics", Second edition, New Age International, 1991.
5. Charles Kittel, "Introduction to solid state physics", Seventh edition, Wiley-India, 2011.
6. R.K. Gaur and S.L. Gupta, "Engineering Physics", Dhanpat Rai, 2012.
7. W.H. Hayt and J.A Buck, "Engineering Electromagnetics", Seventh edition, MGH, 2006.

Course Outcomes:

CO1. Students will be able to apply one dimensional Schrödinger's wave equation for computing physical properties of a material theoretically.

CO2. Students will be able to analyse suitability of lasers for engineering applications.

CO3. Students will be able to verify conductivity of metals theoretically.

CO4. Students will be able to explain applications of semiconductors and superconductors.

CO5. Students will be able to identify crystal structure of cubic crystals.

CO6. Students will be able to analyse the necessity of dielectric materials for engineering applications.

CO7. Students will be able to apply suitability of electromagnetic waves and optical fibers for communication systems.

CO8. Students will be able to identify the properties of ultrasonic waves and nanomaterials for engineering applications.

Question paper pattern for SEE :

1. Total of **eight** questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** subdivisions.
3. Any **five** full questions are to be answered choosing at least **one** from each unit.

UME163C/ UME263C: ELEMENTS OF MECHANICAL ENGINEERING

3 Credits (2-2-0)

UNIT – 1

Steam formation: **L-6 hours, T-8 hours**

Introduction, Formation of Steam, TS,PH,PV diagram, Types of steam, Steam properties: specific volume, enthalpy, internal energy and Entropy (numerical problems), Working of steam boilers: Babcox and Wilcox Boiler, Lancashire Boiler, List of mountings, accessories, their locations and applications.

Water Turbine: Introducton, Classification, Working principle and operation of Pelton wheel, Francis turbine and Kaplan turbine

Steam Turbine: Introduction, Classification, Working principle and operation of Impulse and Reaction turbine, Necessity of compounding of Impulse turbine

Gas Turbine: Introduction, Classification, Working of open and close gas turbine with schematic diagram, Comparision between open and close gas turbine.

UNIT-II

Automobile Engineering: **L-6 hours, T-8 hours**

Introduction, History and development of an automobile, Classification of automobiles, Layout of four wheeler (Layout diagram), Definition and working (function and block diagram): clutch, gear box, rear axle.

Internal Combustion Engines: Introduction, Classification of I.C. engines, Parts of I. C. engines, I.C. engines nomenclature, Working of four stroke petrol and diesel engines, Comparison between SI and CI engines, Calculations: I.P., B.P., mechanical efficiency, thermal efficiency, volumetric efficiency, specific fuel consumption, brake specific energy consumption, Problems on four stroke engine.

UNIT-III

Refrigeration and air- conditioning: **L-10 Hours**

Introduction**,** Definition of refrigeration, Principle of refrigeration, Unit of refrigeration (TR), Co-efficient of performance, Relative co-efficient of performance, Working of vapour compression refrigeration system (VCRS), Working of vapour absorption refrigeration system (VARS), Comparison between VCRS and VARS, Working of room air- conditioner.

Metal Joining Process: Definition: Soldering, brazing and welding, Working principle: soldering and brazing, Welding process: Definition, Principles, Classification, Application, Advantages & limitations of welding, Arc welding process, Gas welding: Gas welding process, types of gas flames, Comparison between soldering, brazing and welding.

Lubrication and Bearings: Lubricants: Classification and properties, **Bearing**: Classification of bearings, Working with sketch: Bush bearing, pedestal bearing, pivotal bearing, collar bearing and antifriction bearing.

UNIT-IV

Power transmission: **L-6 hours, T-10 Hours**

Belt drives: Open belt drive, Crossed belt drive, Derivation: Length of belt for open system and crossed systems, Velocity ratio of belt drives, Slip, Creep, Belt tension, Power transmitted by a belt drive, Comparison between flat and V belt drives, Problems.

Gear drives: Type of gear drives, Nomenclatures of spur gear with sketch, Advantages of gear drives, Disadvantages of gear drives, velocity ratio of gear drives, Gear trains: Simple and compound gear trains, Problems.

Industrial Engineering:

Concept of Industrial Engineering: Definition, History and development, Roles of Industrial Engineer, Application of Industrial Engineering, Scope of Industrial Engineering.

Total: L- 28 Hours, T-26 Hours

Text Books :

1. K.R. Gopalkrishna, "Elements of Mechanical Engineering", 37th edition, Subhas, 2017.
2. S. Trymbaka Murthy, "Element of Mechanical Engineering" 3rd edition, IK International, 2010.

Reference Books:

1. B. Agarawal and C.M. Agarwal, "Basic Mechanical Engineering", Wiley, 2011.
2. R. K. Rajput, "Automobile Engineering", Laxmi, 2013.
3. T. R. Banga and S.C. Sherma, Industrial Engineering and Management, 11th edition, Khanna, 2013.
4. A. S. Ravindra, "Elements of Mechanical Engineering", 8th edition, Cengage, 2011.

Course Outcomes: After taking this course the students shall be able to:

CO1. Understand the concepts of (i) formation of steam and properties, solving problems on formation of steam, (ii) boilers, water turbines, steam turbines and gas turbines.

CO2. Learn history and development of automobile engineering and layout of four wheeler, understand the concepts of I.C.Engines and solving problems on four stroke engines.

CO3. Understand the concepts of refrigeration & air conditioning, metal joining techniques and lubrication & bearing.

CO4. Learn the fundamental concepts of power transmission like belt & gear drives, of industrial engineering. Solving problems on belt drives.

Question paper pattern for SEE:

1. Total of **eight** questions with **two** from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** subdivisions.
3. Any **five** Full questions are to be answered choosing at least **one** from each unit.

UEE164C/ UEE264C: BASIC ELECTRICAL ENGINEERING

3 CREDITS (2-2-0)

UNIT –I

L-07 Hours, T-06 Hours

INTRODUCTION TO ELECTRICAL ENGINEERING:

Generation, Transmission and distribution of electrical energy

ELECTROMAGNETISM:

- Properties of magnetic materials, series and parallel magnetic circuits, comparison between magnetic and electric circuits.
- Statically and dynamically induced emf.
- Transformer: Construction, EMF equation, No load and On load operation, Losses and efficiency

DC CIRCUTS

KCL, KVL, Mesh, Nodal Analysis, Basic Problems.

UNIT –II

SINGLE – PHASE A. C. CIRCUITS: **L-06 Hours, T-07 Hours**

- Comparison between AC and DC.
- Phasor representation of an alternating quantity
- Phasor algebra
- Series and Parallel AC circuits to calculate voltage, current, power factor, real power, energy, reactive power, apparent power.

TRANSFORMER:

- Constructions, EMF equation, No load and On load operation. Losses and efficiency.

UNIT –III

THREE – PHASE A.C. CIRCUITS: **L-07 Hours, T-06 Hours**

- Necessity and advantages of three phase supply
- Representation of 3 phase waveform and phasors
- Star and delta connection.
- Measurement of power using two wattmeters (for balanced load only)

GENERATORS:

- **DC Generator**: Construction, principle of operation, emf equation
- **AC Generator:** Construction, principle of operation, emf equation

UNIT –IV

MOTORS: **L-06 Hours, T-07 Hours**

- **DC Motor:** Significance of back emf, Principle of operation, Mechanical power developed, torque equations, types of motors and applications.
- **AC Motor:** Construction of induction motor and types of motors and applications, principle of operation of three phase induction motor, production of rotating magnetic field, frequency of rotor current, slip, torque equation, torque slip characteristics, single phase capacitor run induction motor and applications.

ELECTRICAL WIRING AND SAFETY:

- Fuses, Necessity of Earthing, Types of Earthing
- Electrical wiring Calculation of energy consumption and billing

Total: L-26 Hours, T-26 Hours

Text Books:

1 E. Hughes, "Electrical and Electronics Technology", Pearson, 2010

2 Tharaja B.L, Fundamentals of Electrical Engineering and Electronics, S. Chand & Co. Limited, New Delhi 2008.

Reference Books:

1. Rajendra Prasad, "A Text Book on Fundamentals of Electrical Engineering", 2nd edition, PHI, 2009.
2. Mittal V.N. and Mittal A, "Basic Electrical Engineering", 2nd edition, TMH New Delhi, 2008.
3. Schaum Outline Series, "Basic Electrical Engineering", McGraw Hill, 2008
4. Vincet Del Toro, "Electrical Engineering Fundamentals", PHI, 2006
5. S.K. Bhattacharya, "Basic Electrical Engineering", Pearson, 2012

Course Outcomes:

CO1. Students will be able to recall basics of magnetic circuits, electromagnetism, DC circuits, single phase and three phase circuits, construction and operation of AC and DC machines

CO2. Students shall be able to explain magnetic circuits,; Single phase series and parallel circuits; Three phase AC circuits; AC machines (emf, torque, losses) and DC machines (emf, speed, torque, back emf,)

CO3. Students shall be able to identify the applications of: Magnetic circuits, DC circuits Single phase and Three phase circuits, AC and DC machines and their advantages and disadvantages.

CO4. Students shall be able to classify and compare: electric and magnetic circuits, DC circuits, statically and dynamically induced emf, single phase series and parallel circuits, three phase star and delta connections, different types of DC and AC machines.

CO5. Students shall be able to draw and demonstrate the phasor diagrams of various single phase and three phase circuits and calculate voltage, current and power for single phase and three phase star and delta circuits.

CO6. Students shall be able to compute/calculate different parameters related to magnetic circuits, DC circuits, single phase and three phase AC circuits, AC and DC machines.

Question paper pattern for SEE:

1. Total of **eight** questions with **two** from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** subdivisions.
3. Any **five** Full questions are to be answered choosing at least **one** from each unit.

UCS165C/ UCS265C: PROGRAMMING WITH C

3 CREDITS (3-0-0)

UNIT-I

Introduction to Computer Science: **L-10 Hours**

Overview of Computer Science, Hardware and Software, Information Processing cycle, algorithms and flowcharts, Why C? Scope of Computer Science, Applications.

Overview of C language

Introduction, features, structure of C program, C**onstants, Variables and Data types** Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Example programs.

Operators and Expressions

Arithmetic operators, logical operators, relational operators, assignment operators, Increment and decrement operators, conditional operators, bitwise operators, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversion in expressions, operator precedence and associatively, Example programs.

Managing Input / Output operations

Formatted and Unformatted input/output statements, Example programs.

UNIT-II

Decision making and Branching: **L-10 Hours**

Decision making with if, if-else, nested if statements, else-if ladders, switch statement?: Operator, goto statement.

While statement, do while statement, for statement, jumps in loops, Example programs.

Arrays

One dimensional arrays, declaration of one-dimensional arrays, initialization of one-dimensional arrays. Declaration of two-dimensional arrays, initialization of two-dimensional arrays. Example programs.

UNIT-III

Strings: **L-10 Hours**

Introduction, Declaration of strings, initialization of strings, string-handling functions Example programs.

User defined functions

Need of user-defined functions, a multifunction program, elements of user defined functions, definition of function, return values and their types, function calls, function declaration, category of functions, nesting of functions, Introduction to recursion, Example programs.

UNIT-IV

Introduction to structures: **L-10 Hours**

Defining a structure, Declaring structure variables, accessing structure members, Initialization, Copying and comparing structure variables, Operations on individual members, array of structure, Example programs.

Command line arguments, Preprocessor, directives.

Total: L -40 Hours

Text Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th edition, McGraw Hill Education (India), 2017.

Reference Books:

1. Behrouz Forouzon and Richard Gilberg, Computer Science: A Structured Programming approach using C, 3rd edition, 2005.
2. Yashwant Kanitkar, Let us C, Seventh edition, BPB publications, 2007.
3. V. Rajaraman, Computer Programming in C, 1st edition, PHI publications, 2002.
4. M. Morris Mano, Digital Logic and Computer Design, 7th edition, Pearson Education, 2016.
5. Mullish Cooper, The Spirit of C, 28th edition , Jaico Book Publishers, 2006.
6. Kernighan and Ritchie, C Programming Language, 2nd edition, 1988, 49th Reprint (2017).
7. B. S. Anami, S. A. Angadi & S. S. Manvi, Computer Concepts and C Programming-A Holistic approach to learning C, 2nd edition, PHI, 2010.

Course Outcomes:

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

CO1. Understand the functioning of computer components.

CO2. Design an algorithmic solution for a given problem.

CO3. Develop C programs for the designed algorithms.

CO4. Debug and trace the given C program manually and using the tools.

CO5. Apply the learnt programming constructs to develop simple real-world applications.

Question paper pattern for SEE:

1. Total of **eight** questions with **two** from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** subdivisions.
3. Any **five** Full questions are to be answered choosing at least **one** from each unit.

UHS126M/UHS226M: CONSTITUTION OF INDIA
(MANDATORY SUBJECT)

UNIT I

Introduction to the Constitution: **L-7 Hours**

Meaning and importance of the Constitution, salient features of Indian Constitution. Preamble of the Constitution. Fundamental rights- meaning and limitations. Directive principles of state policy and fundamental duties- enforcement and their relevance .

UNIT-II

Union Government : **L-6 Hours**

Union Executive- President, Vice-president, Prime Minister, Council of Ministers. Union Legislature- Parliament and Parliamentary proceedings. Union Judiciary-Supreme Court of India–composition, powers and functions.

UNIT-III

State and Local Governments : **L-7 Hours**

State Executive- Governor, Chief Minister, Council of Ministers. State Legislature-State Legislative Assembly and State Legislative Council. State Judiciary-High court. Local Government-Panchayat raj system with special reference to 73rd and 74th Amendments.

UNIT-IV

Emergency provisions, Amendment of the Constitution and Important decided cases. **L-6 Hours**

Types of emergency-grounds, procedure, duration and effects. Amendment of the Constitution- meaning, procedure and limitations.

Total : L-26 Hours

Text Books :

1. Durga Das Basu (D D Basu), "Introduction to the constitution of India",(Student Edition),19th edition, Prentice-Hall EEE, 2008.
2. V. N. Shukla, "Constitution of India", 13th edition, Eastern Book Company, 2017.

Reference Book :

1. Merunandan, "Multiple Choice Questions on Constitution of India", 2nd Edition, Meraga publication, 2007.

Course Outcomes : At the end of this course

CO1. Students will be able to gain knowledge of Indian Constitution.

CO2. Students will be able to understand significance of the fundamental rights, realize importance of directive principles of state policy and fundamental duties in nation building.

CO3. Students will be able to gain knowledge of structure of Union Government, State Government and Local Governments in India.

CO4. Students will be able to know emergency provisions and procedure to pass amendments to the constitution.

Question paper pattern for SEE:

Question paper is of objective type (MCQs) covering all the four units.

UPH166L/ UPH266L: ENGINEERING PHYSICS LABORATORY

1.5 Credits (0-0-3)

LIST OF EXPERIMENTS IN ENGINEERING PHYSICS LABORATORY

1. Determination of Fermi energy for a conductor.
2. Determination of dielectric constant by RC charging and discharging method.
3. The study of frequency response in series and parallel LCR circuits.
4. Black box experiment to identify passive components and estimate their values.
5. Determination of cubic crystal structures using diffractograms.
6. Determination of rigidity modulus of a wire by torsional pendulum method.
7. Determination of Young's modulus of a metal strip by single cantilever method.
8. Measurement of wavelength of a laser using diffraction grating.
9. Determination of Planck's constant using LEDs.
10. Measurement of velocity of ultrasonic waves in liquids by using ultrasonic interferometer.
11. Verification of Stefan's law.
12. Determination of specific heat of a solid or liquid using calorimeter.
13. Determination of viscosity of a liquid (Stokes method or Redwood viscometer or Saybolt viscometer).
14. Measurement of numerical aperture and attenuation of an optical fiber.
15. Photo diode characteristics.
16. Determination of thermal conductivity of solids.
17. Stirling engine working principle (Demonstration).

Note:

1. Ten experiments are to be conducted.
2. The student has to perform two experiments during the SEE practical examinations.

Course Outcomes:

CO1. Students will be able to develop individual experimental skills.

CO2. Students will be able to apply measuring tools for precision measurements.

CO3. Students will be able to experiment with basic electrical components in designing circuits.

CO4. Students will be able to measure properties of different materials.

Laboratory assessment:

1) Each laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
2) Allocation of 50 marks for CIE:
   - Performance and journal write-up: Marks for each experiment = 30 marks / No of proposed experiments.
   - One practical test for 20 marks (5 write-up, 10 measurements, calculations, results etc.., 5 viva-voce).
3) Allocation of 50 marks for SEE: 25% write-up, 50% measurements, calculations, results etc.., 25% viva-voce.

UCS167L/ UCS267L: C PROGRAMMING LABORATORY

1.5 Credits (0-0-3)

Minimum programs expected to be developed include:

1. Program to demonstrate the knowledge of I/O statements
2. Program to demonstrate the use of C operators
3. Programs to illustrate the application of conditional statements
4. Programs to employ the looping constructs
5. Application programs based on arrays
6. Application Programs based strings
7. Demonstrate modular programming approach using functions
8. Application development based on structures
9. Programs to demonstrate command line arguments

Example Programs

1. Write a C program to find the largest of three numbers (Nested if).
2. If cost and selling price of an item are the inputs, write a C program to determine whether the seller has made profit or incurred loss. Also determine how much profit he made or loss he incurred. (if-else)
3. Write a C program to find all the roots of a quadratic equation. (Using if – else and library functions)
4. Write a C program display the position of a given point with coordinates (x, y) on a plane (if-else and logical operators)
5. Write a C program to find area of circle, triangle, rectangle, square using switch statement
6. Write a C program to find and display the sum of first N natural numbers. Also compute and display the sum of odd and even numbers.(looping)
7. Write a C program to find the GCD and LCM of two integers numbers (use Euclid's Algorithm). (looping)
8. Write a C program to check whether the number is prime or not. Display appropriate message. (looping)
9. Write a program to print the multiplication table of the number entered by the user. The table should get displayed in the following form: (looping)

   I. 29*1=29

   II. 29*2=58

   III. ….
10. Write a C program to find the sum of the following series (looping): $Sin(X)= X - X^3/3! + X^5/5! - X^7/7! + \ldots\ldots$
11. Write a C program to read N integer numbers and arrange them in ascending order using bubble sort technique (Arrays, Sorting, Bubble sort).
12. Write a C program to sort a list of N integer numbers and search the given

key element using binary search method. Display the result using the suitable message (Searching, Binary search).

13. Write a C program to read a matrix of order M*N and find the sum of principal and secondary diagonal elements. (Matrix read print, primary and secondary diagonal elements of matrix).
14. Write a C program to accept a string and reverse it without using library functions. Display the original and reversed string. (String handling)
15. Write a C program to read 'N' elements into an array and compute the sum of all the elements stored in an array (Arrays).
16. Write a C program to find the factorial of a given integer number using recursive function. Accept number as command line argument. (Recursive function, command line arguments).
17. Write a C program to read list of integer numbers and find the mean, standard deviation and count number of integers less than mean of the list. Display all results in main function (Standard deviation, passing arrays to functions, returning one and more values from function). Use the following functions:
    a. To read given list of numbers.
    b. To find mean and standard deviation (single function).
    c. To find the number of elements those are less than the mean of that list.
18. Write a C program to read a matrix of order (M *N) and (P * Q) and compute the product of two matrices. (Passing matrix to functions). Use functions to:
    a. To read given matrices
    b. To compute the product of two matrices
    c. To print product matrix.
19. Write a C program to read n students information and display the information with Appropriate headings, where each student information consists of roll number, Name, total marks scored (Structure handling).
20. Write a C Program to accept p, t and r at the command line and print the simple interest.

Course Outcomes :

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

CO1. Analyze a given problem and propose a solution.

CO2. Design an algorithmic solution for a given problem.

CO3. Develop well-indented C program for a given algorithm, according to coding standards.

CO4. Debug and execute a given program.

CO5. Document the developed programming solution as per the standards

Laboratory assessment:

1) Each laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
2) Allocation of 50 Marks for CIE:
   - Performance and journal write-up: 1.5 Marks for each assignment.
   - One practical test for 20 marks (5 for write-up, 10 for Conduction and Execution of assignments, 5 for viva-voce).
3) Allocation of 50 marks for SEE: 25% write-up, 50% conduction and execution, 25% viva-voce.

UCH168C /UCH268C: ENGINEERING CHEMISTRY
4 Credits (3–2–0)

UNIT – I

Principles of volumetric analysis **L–10 Hours, T–6 Hours**

Introduction, Fundamentals of volumetric analysis. Terminology - Titration, equivalence point, indicators. Types of titrations – Acid-Base, Complexation, Precipitation & Redox titrations. Standard solution – concentration terms; Normality, Molarity, Mole fraction, percentage by weight and numericals on Normality & Molarity. Requirements of primary standard substance.

Acid-base titration: Acids-base indicator, Ostwald's theory of acid – base indicator. Action of indicator – Phenolphthalein & Methyl orange. Choice of indicator for acid-base titrations, Titration curves – HCl v/s NaOH , Na_2CO_3 v/s HCl.

Bio Fuels:

Introduction, Limits of conventional fuel & Need for Biofuel. Classification of bio fuels. Biomass, Sources of biomass. Biodiesel- production of biodiesel by transesterification, mechanism of acid catalyzed reaction and alkali catalyzed reactions. Advantages and disadvantages of biodiesel. Fuel cell technology eg: $CH_3OH – O_2$ fuel cell. Microbial production of bio gas (Bio-methanation).

Bio refineries: concept, types of bio refineries, Co production of ethanol and other chemicals.

Self study: Identification of non-edible seeds for biodiesel production and combustion characteristics.

UNIT – II

Corrosion Science **L – 10 Hours, T – 8 Hours**

Introduction, Corrosion: –Definition, Types of corrosion-Chemical (Dry) and Electrochemical (Wet) corrosion. Theory of electrochemical corrosion by taking Iron as an example. Types of Electrochemical corrosion - Differential metal corrosion, Differential aeration corrosion. e.g. water line corrosion, Pitting corrosion. Stress corrosion e.g. Caustic embrittlement. Factors affecting the rate of corrosion; Related to metal & Related to environment. Numericals on Corrosion Penetration Rate (CPR) & Weight loss method.

Corrosion Control: Protective coatings: Inorganic coatings – (i) Anodizing – meaning, Anodizing of Al and applications (ii) Phosphating – process and applications. Cathodic protection - i) Sacrificial anodic method ii) Impressed current method.

Self study: Corrosion control by Metallic coatings.

Metal Finishing

Introduction, Technological importance of metal finishing. Factors governing electroplating - Polarization , Decomposition potential and Over voltage.

Electroplating process: Theory of electroplating - Definition, Principle components of an electroplating bath. Effects of plating variables on the nature of electro deposit. Determination of throwing power of plating bath by Harring Blum cell and Numericals. Surface preparation for electroplating. Electroplating of Chromium and applications.

Electroless plating:- Meaning, Distinction between electroplating and electroless plating. Surface preparation, Electroless plating of Copper on PCB and applications.

UNIT – III

Green Chemistry **L – 10 Hours, T – 6 Hours**

Introduction, Aims and Objectives, Major environmental pollutants, Basic principles (12 principles). Various green chemical approaches – Microwave synthesis, Bio catalysed reactions, Phase transfer catalysis. Synthesis of typical organic compounds by conventional and green route - i) Adipic acid ii) Indigo.

Atom economy – Synthesis of ethylene oxide & Ethyl bromide. Industrial applications of green chemistry.

Self study: Numericals on Atom economy.

Pollution abatement in chemical industries

Introduction, Need for abatement of pollutants, Effect of industrial pollutants on environment. Abatement processes in Sugar industry and Cement Industry: Standards for effluents discharge, nature of effluents, ill effects and treatment procedure in each industry.

Effluent Analysis: Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Numericals on COD & BOD.

UNIT – IV

Engineering materials **L – 10 Hours, T – 6 Hours**

Polymer composites: Introduction, structure of polymer composites Preperation, Properties and applications of Kevlar and Carbon fibres.

Organic Light Emitting Diodes (OLEDs): Introduction, Definition, Anatomy of OLED, Types of OLEDs, Comparisons between LED and OLED, Advantages and Disadvantages. Applications of OLEDs.

Shape Memories Alloys: Introduction, Phases of Shape Memories Alloys, Shape Memories effect – One way and Two way effects. Example – Nitinol(Ni-Ti Alloy): Meaning, Composition, Production by Vacuum Arc Remelting (VAR) method. Properties – Physical and Mechanical. Applications of Nitinol.

Polymer materials

Plastics & Resins: Introduction, Commercial thermoplastics & thermosets. Preparation, Properties & Applications of plasticized PVC & PET.

Elastomers: Introduction, Classification, Olefin elastomers, Synthetic rubber, Preparation, Properties & Applications of Poly sulphide rubber & Silicon rubber.

Adhesives: Introduction, Classification, Preparation, Properties & Applications of Epoxy resin.

Conducting Polymers: Introduction, Mechanism of conduction in polyacetylene, enhancing conductivity in poly acetylene by doping methods. Applications of conducting polymers.

Biodegradable Polymer : Introduction, Composition, Preparation, Properties & Applications of poly lactic acid (PLA) and poly caprolactone (PCL).

Self study: Biodegradable methods:

i) Photodegradable
ii) Hydrodegradable

Total :L- 40 Hours, T-26Hours

Text Books:

1. Engineering Chemistry by Dr. Suba Ramesh etal. First Edn. 2011, Wiley India Pvt. Ltd., Delhi.
2. A Text Book of Engineering Chemistry by Shashi Chawla, Third Edn, 2003, Dhantpat Rai & Co. Pvt., Pub. Delhi.

Reference Books:

1. Principles of Physical Chemistry B. R. Puri, L.R. Sharma & M.S. Pathania,&Co., 33rd Ed.,1992.
2. Engineering Chemistry by Jain & Jain, 15th Edn., Dhanapath Rai pub. Co.
3. A Text Book of Engineering Chemistry by Dr. P. L. Timmanagoudar & Dr. S. K. Patil, First Edn., 2014, EBPB, Gadag
4. Environmental Chemistry with Green Chemistry, by Dr. A. K. Das, Books & Allied (P) Ltd, Kolkata, 2012.
5. Green organic Chemistry by Kenneth Doxsee & James Huchison, 1st edn., 2004.
6. Polymer Science by V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, New Age Int. Publication.
7. Introduction to Bio fuels by David M. Mousdale
8. Bio fuels by Wim Soetaert Erick J. Vandamme
9. Shape memory materials by K Otsuka & C M Wayman, 1998, Cambridge Uni. Press.
10. Organic Light Emitting Diodes, Materials, devices & Applications by Alastaer Buckley, Woodhead Publishing Ltd. 2013, Delhi.

Course Outcomes:

The student will be;

1. Able to conduct experiment along with analysis and interpretation of data.
2. Able to identify renewable sources to solve conventional crises.
3. Able to develop practical solutions for control of corrosion in metallic structures.
4. Able to impart modification of surface properties in various engineering materials.
5. Able to utilize eco friendly reactions scheme and chemical process for the need of the society.
6. Able to resolve the effect of chemicals for industry and environmental related problems.
7. Able to discuss the evolution of new materials for future applications.
8. Able to apply knowledge to replace conventional materials by polymers for various engineering applications.

Question paper pattern for SEE :

1. Total of **eight** questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** subdivisions.
3. Any **five** full questions are to be answered choosing at least **one** from each unit.

UEC169C /UEC269C: BASIC ELECTRONICS

3 Credits (2-2-0)

UNIT - I

L – 08 Hours, T – 06 Hours

Scope and Applications of Electronics, Communication and Instrumentation Engineering. Diode Applications: Half Wave Rectification, Full Wave Rectification, Rectifier with Shunt Capacitor (qualitative analysis), Zener Diode Voltage Regulator, DC Voltage Multipliers, Diode logic Gates. Bipolar Junction Transistors: Transistor operation, Transistor Voltages and Currents, Common-Base Characteristics, Common-Emitter Characteristics and Common-Collector Characteristics.

UNIT - II

L – 07 Hours, T – 08 Hours

BJT Biasing and Applications: The DC Load Line and Bias Point, Base Bias, Collector to Base Bias, Voltage Divider Bias, Comparison of Basic Bias Circuits. Amplifier: Decibels and half power points, Single-Stage CE Amplifier. Oscillators: Concept of Feedback, Positive and Negative Feedback, Barkhausen criterion, BJT RC Phase Shift Oscillator, Hartley Oscillator, Colpitt's Oscillator and Crystal (qualitative analysis) Oscillator.

UNIT - III

L – 07 Hours, T – 06 Hours

Number Systems: Introduction, Decimal, Binary and Hexadecimal Number Systems. Addition and subtraction, Binary Coded Decimal Numbers. Digital Logic: Boolean Algebra, Logic Gates, Universal Gates, Half and Full Adder, Parallel Adder. Advantages of Digital systems over Analog systems.

UNIT - IV

L – 08 Hours, T – 06 Hours

Introduction to Communication System: Basic Communication Block Diagram. Modulation: Need for Modulation, Amplitude and Frequency Modulation & Demodulation (qualitative discussion only). Meaning of Instrumentation System, Generalised block diagram of Instrumentation System- Open loop and Closed loop systems, examples. Sensors and Transducers: Definition, meaning and classification.

Total: L–30 Hours, T–26 Hours

Text Books :

1. David A. Bell, “Electronic Devices and Circuits”, 4th edition, PHI, 2006.
2. George Kennedy, “Electronic Communication Systems”, 4th edition. TMH, 2005.

Reference Books :

1. Floyd and Jain, "Digital fundamentals", 8th edition, Pearson, 2006.
2. Jacob Milliman, Christos C. Halkies, "Electronics Devices and Circuits", TMH, 2001.
3. A. P. Malvino, "Electronic Principles", 7th edition, TMH, 2003.

Course Outcomes :

A student who successfully completes this course should be able to :

CO1. Analyze and design diode circuits, configure transistor circuits.
CO2. Distinguish transistor biasing methods and design oscillators.
CO3. Do number system conversions, and implement basic logic circuits.
CO4. Comprehend the necessity of communication systems and need for modulation.

Question paper pattern for SEE:

1. Total of **eight** questions with **two** from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** sub divisions.
3. Any **five** full questions are to be answered choosing at least **one** from each unit.

UCV170C /UCV270C: ENGINEERING MECHANICS

3 Credits (2-2-0)

UNIT –I

Chapter 1 **L-07 Hours, T – 06 Hours**

Brief Introduction to Civil Engineering Introduction to Engineering Mechanics. Aarticle, Rigid body, Deformable body, Idealisations in Mechanics Definition of force and system of forces. Principle of transmissibility of forces. Resolution and composition of forces. Resultant of Coplanar concurrent forces. Equilibrium of Coplanar concurrent forces (Equilibrium of particle), problems.

Chapter 2

Moment and Couple

Moment and Couple and Resultant of coplanar non concurrent forces problems

UNIT – II

Chapter 3 **L-07 Hours, T – 06 Hours**

Equilibrium of Coplanar non - concurrent forces

Support Reactions : Types of beams and supports, Types of External forces problems

Chapter 4

Friction

Types of friction, Laws of friction, Limiting friction, Angle of friction, Angle of repose, Impending motions on horizontal and inclined planes problems.

UNIT – III

Chapter 5 **L-07 Hours, T – 06 Hours**

Centroid

Derivations for the expressions of locating centroids of Rectangle, Triangle, Semicircle, and Quarter circle by the method of integration, problems

Chapter 6

Moment of Inertia

Introduction to Moment of Inertia parallel axes theorem and Perpendicular axis theorem, Radius of gyration, Determination of moment of Intertia of rectangular, circular, triangular, semicircular and Quarter of circle by the method of integration. Problems

UNIT – IV

Chapter 7 **L-07 Hours, T – 08 Hours**

Kinematics

Kinematics Displacement, Distance, Instantaneous velocity, Instantaneous acceleration, Motion along straight line and motion due to gravity problems

Chapter 8

Curvilinear Motion

Introduction to Curvilinear motion, projectiles problems.

Total: L–28 Hours, T–26 Hours

Text Books :

1. Ferdinand P. Beer & E. Russel Johnston Jr. "Mechanics for Engineers (Statics & Dynamics)", Tata Mc Graw Hill Publications, New Delhi, 2016.
2. K.V. Rao and G. C. Raju "Elements of Civil Engineering and Engineering Mechanics" 3rd edition, Subhas Publications, Bangalore, 2002.

Reference Books:

1. Timoshenko, "Engineering Mechanics", 4th edition, Mc Graw Hill Publications, New York, 2007.
2. Singers F. L, "Engineering Mechanics static and dynamics", 3rd edition, Horper and International, New York, 1975.
3. Popv, "Engineering Mechanics", 2nd Edition, PHI , New Delhi, 1995.
4. Shames, "Engineering Mechanics Statics and Dynamics", 4th edition, PHI , New Delhi 1996.

Course outcomes:

CO 1. It helps the students to develop an ability to apply the knowledge of the basic concepts and principles of mechanics.

CO 2. It develops an ability to identify, formulate and analyse the structures subjected to forces.

CO 3. It helps to develop ability to use technical skills, modern Engineering tools necessary for engineering practice.

CO 4. It supports for further study of subjects like mechanics of materials and structural analysis.

Question paper pattern for SEE:

1. Total of **eight** questions with **two** from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** sub divisions.
3. Any **five** full questions are to be answered choosing at least **one** from each unit.

UBT133M /UBT233M: ENVIRONMENTAL STUDIES
(MANDATORY SUBJECT)

UNIT-1

Environment & Ecology: **L- 07 Hours**

Environmental segments, ecosystem and classification of ecosystem, EIA.

Environmental impacts of human activities: agriculture, transportation, industry, mining, urbanization.

Natural Resources:

Forest, water, mineral, food, land resources and biodiversity.

Renewable energy: Sources, Solar, wind, hydropower, tidal, ocean & geo thermal energy, biomass energy-biodiesel, bioethanol & biogas; hydrogen as fuel.

Non renewable Energy Sources : Coal, Petroleum, Natural gas & Nuclear energy.

UNIT-II

Environmental pollution : **L-07 Hours**

Water pollution: Water quality standards, water borne diseases, fluoride problem; air pollution, noise pollution ; effect of electro magnetic waves.

Sustainable future :

Concept of sustainable development, threats to sustainability, over exploitation of resources, strategies for sustainable development. Environment education, conservation of resources. Environment economics – concept of green building, clean development mechanism (CDM), carbon crediting.

UNIT-III

Current environmental issues of concern: **L-06 hours**

Population growth, greenhouse effect-greenhouse gases and global warming, climate change, ozone layer depletion, acid rain & eutrophication.

Environmental policy legislation rules & regulations :

National environmental policy, environment protection act, legal aspects of air & water act. Functions of government agencies.

UNIT-IV

Fundamentals of waste management **L-06 hours**

Solid waste management: Sources, classification, characteristics, collection & transportation, disposal, and processing methods. Hazardous waste management and handling.

Concept of waste water treatment , Bioremediation.

Industrial waste management (Case studies: cement, chemical, E–waste, food & construction industry waste management).

Total: L- 26 Hours

Text Books:

1. Benny Joseph, "Environmental Studies", Tata McGraw Hill, 2005.
2. Anubha Koushik and C. P. Koushik "Environmental Science and Engineering" New Age International Publishers, New Delhi, 2006

Reference Books:

1. D. L. Manjunath, "Environmental Studies", Pearson Education, 2006
2. Meenakshi, "Environmental Science & Engineering", Pranticce Hall of India, 2006.
3. S. K. Garg, "Environmental Science & Ecological Studies", Khanna Publishers New Delhi, 2007.
4. P.D.Sharma, "Ecology and Environment", Rastogi Publications, 2012.

Course Outcomes:

CO1. Students will be able to understand basic aspects of environment.

CO2. Students will be able to demonstrate the impacts of human activities on nature.

CO3. Students will be able to classify the natural resources.

CO4. Students will be able to explain the effects of pollution on nature.

CO5. Students will be able to illustrate the concept of sustainable development.

CO6. Students will be able to know about acts regarding environmental protection.

Question paper pattern for SEE:

Question paper is of objective type covering all the four units.

UME171L /UME271L: COMPUTER AIDED ENGINEERING GRAPHICS

2.5 CREDITS (1-0-3)

Projections of points: Projections of points located in all quadrants.

Projections of straight lines:

Projections of lines located in first quadrant only, line parallel to both the planes, perpendicular to one plane and parallel to other, inclined to one plane and parallel to other, inclined to both the planes. Determinations of true length and true inclinations with principal planes.

Projections of planes:

Projections of planes- perpendicular to the both the planes , parallel to one plane and perpendicular to other, inclined to one plane and perpendicular to other and inclined to both the planes.

Projections of solids:

Projections of solids (Prisms, Pyramids, and Cylinders) resting on HP, axis /base inclined to HP only and profile views.(No problems on Tetrahedron .)

Development of solids:

Development of lateral surface of Prisms, Pyramids, Cones, and Cylinders Cut by auxiliary inclined planes.

Isometric Projections:

Isometric projections of Prisms, pyramids, Cones and Cylinders, Combinations of solids (Maximum of two solids Co-Axial Only)

Note: Students are informed to make free hand sketch only in worksheet)

Text Book :

1. K. G. Gopalkrishna, "Engineering Drawing", Vol. I and II, 23rd edition, Subhas, 2014.
2. R. K. Hegde and Niranjan Murthy, "Engineering Graphics", 1st edition, Sapna, 2003.

Reference Book :

1. K.R. Gopalkrishna, "Engineering Graphics", 30th edition, Subhas, 2003.
2. A.R. Bapat, "Engineering Graphics", Allied, 2004.
3. P.I. Varghese, "Engineering Graphics", Mc. Graw Hill, 2013.

Course outcomes:

CO1. The student is able to realize the importance of computing systems in engineering.

CO2. The student is able to develop geometrical models like lines, planes solids.

Laboratory Assessment:

(a) Each laboratory subject is evaluated for 100 marks (50CIE and 50SEE).

(b) Allocation of 50 marks for CIE (30marks for term work (sketching and printouts from SOLID EDGE) and 20 Marks for one practical test).

(c) The SEE practical is conducted for 50 marks of three hour duration, five questions to be from above syllabus. Students has to answer any three questions.

(d) 50 % weigtage is given to sketch and 50% is given to printouts.

UCH172L/UCH272L: ENGINEERING CHEMISTRY LABORATORY

1.5 Credits (0–0–3)

PART – A

1. Determination of viscosity of liquid by Ostwald's Viscometer.
2. Potentiometric estimation of Iron in stainless steel using standard K2Cr2O7 solution.
3. Determination of pKa of a soft drinks using standard NaOH by pH meter.
4. Conductometric estimation of HCl & CH3COOH in acid mixture by Standard NaOH.
5. Colorimetric estimation of copper in PCB.
6. Open Ended Project.

PART – B

1. Preparation and Standardization of a solution.
2. Determination of total hardness of water before and after R.O. treatment by EDTA method.
3. Determination of amount of CaO in the cement solution by EDTA method.
4. Determination of alkalinity of water sample by duel indicator method.
5. Determination of percentage of Fe in mild steel using standard K2Cr2O7 solution.
6. Open Ended Project.

Reference Books:

1. Laboratory manual in Engineering Chemistry - Sudharani , Dhanapatrai, Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denny, 4th Edition.
3. Practical Engineering Chemistry by Sunita & Ratan Pub: S.K.Kataria & Sons.

Course Outcomes:

The student will be;

1. Able to write systematic procedure for setting up & conduct of experiment.
2. Able to perform experiment on volumetric analysis of materials of social relevance individually along with interpretation of results of analysis and calculation.
3. Able to perform experiments using instruments for trace chemical analysis with high accuracy.
4. Able to incorporate the practical knowledge of chemistry for engineering applications.

Laboratory Assesment:

CIE for Lab:

- 25 marks for regular lab conduction and journal write up for 10 experiments **(10 x 2.5 = 25)**
- 05 marks for open ended project
- 20 marks for Lab CIE Test (5 marks for write up, 5 marks for viva &10 marks for estimation.)

SEE for Lab:

- Allocation of 50 marks for SEE : 20% writeup, 60% conduction, calculation, results and 20% viva-voce

UBE173L/UBE273L: BASIC ENGINEERING LABORATORY

2 Credits (0-0-4)

LIST OF EXPERIMENTS IN BASIC ENGINEERING LABORATORY

1. Assembly of parts for different joints.
2. Welding and sheet metal soldering
3. Effect of work on Human body using Industrial Engineering Concepts.
4. Effect of noise and light on human efficiency in work environments.
5. Study on Petrol engine system
6. Study on Diesel engine system
7. Compressive strength of concrete cube.
8. Construction of a polygons using surveying instruments.
9. Measurement of cell using microscope.
10. Biomass separation using centrifugation.
11. Network setup and resource sharing.
12. Searching information through search engines.
13. Exposure to the office tools.
14. Exposure to the computer systems.
15. Temperature measurement using Resistance Temperature Detector (RTD).
16. Simulation of simple analog and digital electronic circuits.
17. Simple wiring exercises.
18. Power measurement - Domestic appliances.
19. Full wave rectifier circuit without and with capacitor filter.
20. Frequency response of single stage RC coupled common emitter amplifier.

Course outcomes:

CO1. The student will be able to understand the importance of interdisciplinary nature of engineering disciplines.

CO2. The student will be able to demonstrate the fundamentals of various engineering fields.

CO3. The student will be able to illustrate engineering knowledge of interdisciplinary nature.

CO4. The student will be able to appreciate and solve problems related to societal needs.

Laboratory assessment:

Each experiment is evaluated for **five** marks (20x5=100 marks).

UMA261C: ENGINEERING MATHEMATICS-II
(Differential Equations and Laplace Transforms)
4 Credits (3-2-0)

UNIT-I

Elementary Linear Algebra: **L-10 Hours, T-06 Hours**

Recap of Matrices: Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method and Gauss-Seidel method. Eigen values and eigen vectors.

Ordinary differential equations of first order:

Exact and reducible to exact differential equations. Linear and Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits.

UNIT-II

Differential Equations of higher order: **L-10 Hours, T-08 Hours**

Second and higher order linear ODE's with constant coefficients-Inverse differential operator, method of variation of parameters(second order); Cauchy's and Legendre homogeneous equations. Applications: Simple harmonic motion and LCR circuits.

UNIT-III

Partial Differential Equations (PDE's): **L-10 Hours, T-06 Hours**

Introduction to PDE : Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Solution of Lagrange's linear PDE, method of separation of variables, Derivation of one dimensional heat and wave equations and solutions by the method of separation of variables.

UNIT-IV

Laplace Transforms: **L-10 Hours, T-06 Hours**

Introduction, Definition of Laplace Transform, Laplace Transform of Elementary functions, Properties: Shifting, differentiation, Integral and division by t. Periodic function, Heaviside's Unit step function

Inverse Laplace transforms :

Properties, Convolution theorem. Solutions of linear differential equations-Applications to Engineering problems.

Total: L- 40 Hours, T-26 Hours

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 43rd edition, 2015.
2. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10th edition, 2016.

Reference Books:

1. James Stewart, "Calculus: Early Transcendentals", Cengage Learning India, 2017.
2. C. Ray Wylie, Louis C.Barrett, "Advanced Engineering Mathematics", 6th edition, McGraw-Hill,1995.
3. B.V. Ramana, "Higher Engineering Mathematics", 11th edition, Tata McGraw-Hill, 2010.
4. N. P. Bali and Manish Goyal, "A Text Book of Engineering Mathematics", 7th edition, Laxmi, New Delhi, 2010.
5. Gupta C. B., Singh S. R. and Mukesh Kumar, "Engineering Mathematics for Semester I & II", McGraw-Hill, New Delhi, 2015.

Course Outcomes: On completion of this course, students are able to:

CO1: Apply the knowledge of matrix theory for solving system of linear equations and compute eigen values and eigen vectors required for matrix.

CO2: Explain various physical models through first and higher order differential equations and solve such linear ordinary differential equations.

CO3: Understand a variety of partial differential equations and solution by exact methods.

CO4: Able to derive heat and wave equation and solve by method of separation of variables.

CO5: Apply the Laplace transform techniques to solve differential equations.

Question paper pattern for SEE :

1. Total of **eight** questions with **two** from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than **four** subdivisions.
3. Any **five** full questions are to be answered choosing at least **one** from each unit.

UPH262C: ENGINEERING PHYSICS
4 Credits (3-2-0)
(ME, CV, AU, IP AND BT BRANCHES)

UNIT I

Vector Mechanics: **L- 10 Hours, T-6 Hours**

Introduction, scalar and vector, representation of vectors, types of vectors, position vector, displacement vector, zero vector and its properties, addition and subtraction of vectors, resolution of vectors, multiplication of vectors-dot product (scalar product) and cross product (vector product). Laws of mechanics (qualitative)–Triangle law, Parallelogram law, Polygon law and Newton's laws. Rectangular component of a vector in space. Numerical problems.

Crystal Structure:

Introduction, directions and planes in a crystal. Miller indices. Expression for interplanar spacing interms of Miller indices. Coordination number, atomic packing factor for SC, BCC, FCC and HCP. Relation between lattice constant and density of a material. Crystal structures of CsCl, NaCl and Diamond. Bragg's Law and Bragg's X-ray spectrometer-determination of wavelength. Determination of cubic crystal structures using diffractrograms. Numerical problems.

UNIT – II

Electrical Properties of Metals: **L-10 Hours, T-6 Hours**

Free electron concept (Drude-Lorentz theory). Classical free electron theory-assumptions. Derivation of electrical conductivity for metals. Effect of impurity and temperature on electrical resistivity of metals (Matthiessen's rule). Failures of classical free electron theory. Quantum free electron theory-assumptions. Fermi-Dirac statistics. Density of states (qualitative). Fermi energy, Fermi factor and variation of Fermi factor with energy for different temperatures. Derivation of Fermi energy for 0K. Merits of quantum free electron theory. Numerical problems.

Dielectric materials:

Polar and non-polar dielectrics. Dielectric polarization, polarization process in polar and non-polar dielectrics, polarization mechanisms. Dielectric constant (derivation), relation between polarization and dielectric constant. Internal field and derivation of internal field in solids and liquids (one dimensional). Clausius-Mossotti relation. Dielectric loss (derivation). Applications of dielectric materials. Numerical problems.

UNIT III

Thermodynamics: **L-10 Hours, T-8 Hours**

Thermodynamics-definition, scope, Microscopic and Macroscopic approaches. Thermodynamic system-closed system, open system (control volume), isolated system, physical examples. Thermodynamic properties–definition, intensive and extensive. Thermodynamic-state point, state diagram, path, process, quasi-static process, cyclic and non-cyclic

processes. Thermodynamic equilibrium-definition, equilibrium attained keeping pressure constant, thermal equilibrium, chemical equilibrium, diathermic wall. Temperature concepts, Equality of temperature, Zeroth law of thermodynamics. Thermometer and thermometric property. Temperature scale, Standard scale, Standard scale of temperature and Temperature measurement. International practical temperature scale. First law of thermodynamics (qualitative). Numerical problems

Fluid Mechanics:

Introduction, definition–fluid mechanics, fluid statics, fluid kinematics and fluid dynamics. Properties of fluids, viscosity, Newton's law of viscosity. Types of fluids, thermodynamic properties, compressibility and bulk modulus, adiabatic and isothermal processes. Surface tension, capillarity, vapor pressure. Fluid pressure at a point. Pascal's law with proof. Numerical problems.

UNIT -IV

Lasers: **L-10 Hours, T-6 Hours**

Introduction, absorption, spontaneous emission and stimulated emission. Einstein's coefficients (expression for energy density). Conditions for laser action, requisites of a laser system, working mechanism of a laser. Characteristics of a laser. Classification of lasers. Construction and working of Nd:YAG, carbon dioxide and semiconductor diode lasers. Laser safety. Applications of lasers- industry, defense, medical and environmental. Numerical problems.

Ultrasonic Waves:

Introduction, generation of ultrasonic waves (inverse piezoelectric method) and properties. Measurement of velocity of ultrasonic waves in solids and liquids. Applications of ultrasonic waves- non destructive testing of materials, medical and elastic constants of solids and liquids. Numerical problems.

Nanoscience:

Introduction, density of states in 1D, 2D and 3D structures. Nanomaterials, synthesis: Top-down and Bottom-up approach - Ball Milling and Sol-Gel methods.

CNT- types, synthesis-Arc discharge and laser ablation methods. CNT mechanical properties and applications. Numerical problems.

Total: L-40 Hours, T- 26 Hours

Text Books:

1. M. N. Avadhanulu and P.G.Kshirsagar, "A Textbook of Engineering Physics", Ninth edition, S. Chand, 2014.

Reference Books:

1. R.K.Puri and V.K.Babbar, "Solid State Physics", S.Chand , 2010.
2. F. P. Beer and E.R. Johnston, "Vector Mechanics for Engineers", Tenth edition, MGH,2013.

3. Y. A. Cengel and M.A. Boles, "Thermodynamics", Sixth edition, MGH, 2009.
4. B. B. Laud, "Lasers and Non-Linear Optics", Second edition, New Age International, 1991.
5. Charles Kittel, "Introduction to solid state physics", Seventh edition, Wiley-India, 2011.
6. R. K. Bansal, "A textbook of Fluid Mechanics", Laxmi, 2012.
7. R.K. Gaur and S.L. Gupta, "Engineering Physics", Dhanpat Rai, 2012.

Course Outcomes:

CO1. Students will be able to apply vector mechanics for solving engineering problems.

CO2. Students will be able to identify crystal structure of cubic crystals.

CO3. Students will be able to verify conductivity of metals theoretically.

CO4. Students will be able to analyse the necessity of dielectric materials for engineering applications.

CO5. Students will be able to apply basics of thermodynamics for solving engineering problems.

CO6. Students will be able to apply basics of fluid mechanics for solving engineering problems.

CO7. Students will be able to analyse suitability of lasers for engineering applications.

CO8. Students will be able to identify the properties of ultrasonic waves and nanomaterials for engineering applications.

Question Paper Pattern SEE:

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Subject: UHS174K/UHS274K: English For Engineers

(Compulsory subject)

1. Vocabulary Building:

1.1 The concept of Word Formation.

1.2 Root words from foreign languages and their use in English.

1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.

1.4 Vocabulary: synonyms, antonyms, homonyms, homophones, standard abbreviations and contractions.

2. Basic Writing Skills:

2.1 The functions of Tenses and the sequence of Tenses.

2.2 Use of phrases and clauses in sentences.

2.3 Sentence structure.

2.4 Importance of proper punctuations.

2.5 Identifying common errors in writing: subject-verb agreement, noun-pronoun agreement, articles and preposition, redundancies, clichés.

3. Reading and Writing Practices:

3.1 Reading comprehension and composition.

3.2 Precis writing (The art of condensation).

3.3 Techniques of essay writing.

3.4 Technical reports and proposals writing.

3.5 Employment communication:

Letter writing, resume writing with cover letter, e-mail writing and blogs writing.

4. Oral Communication:

(This unit involves interactive practice session in language lab)

4.1 Listening comprehension.

4.2 Communication skills.

4.3 Conversations and Dialogues (common everyday situations) presentation skills.

4.4 Workplace communication:

Group discussion and job/ personal interviews.

Total: L-26 Hours

Text Books:

1. Gajendra Singh Chauhan and Et al, 'Technical Communication', Cengage learning India Pvt. Limited, 2019.
2. Sanjay Kumar and Pushpalatha, 'Communication Skills', 3rd Edition, Oxford University Press, 2019.

Reference Books:

1. English Language Communication Skills (Lab Manual cum Workbook) published by Cengage Indian Private Limited – 2018.
2. Meenakshi Raman and Sangeetha Sharma, 'Technical Communication', 3rd Edition Oxford University Press, - 2017.
3. M Ashraf Rizvi, Effective Technical Communication, Second Edition, McGraw Hill Education (India) Private Limited – 2018.

Course Outcomes:

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

1. Get familiarized with English vocabulary.
2. Identify common errors in spoken and written communication.
3. Improve nature and style of sensible writing and acquire communication skills.
4. Able to communicate proficiently.