BVVS

BASAVESHWAR ENGINEERING COLLEGE (Autonomous), BAGALKOT - 587103

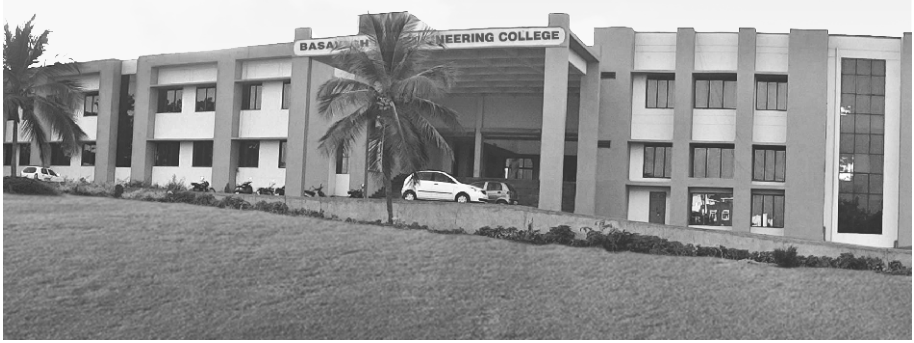
Institution Permenantely affiliated to Visvesvaraya Technological University Belagavi-590 018, Karnataka State, Approved by AICTE, Accredited by NAAC, New Delhi with 'A' Grade

SYLLABUS

for

I & II Semester B.E. Programme

2020-21



College selected for TEQIP-I, TEQIP-II and TEQIP-III
a World Bank Supported Project Implemented by MHRD Government of India

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.

SCHEME OF TEACHING AND EXAMINATION
B.E. I SEMESTER
2020-21

PHYSICS GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			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**

* Question paper will be of objective type. Students have to secure passing marks for eligibility, however marks will not be considered for award of Grade/Class/Rank.

SCHEME OF TEACHING AND EXAMINATION
B.E. I SEMESTER
2020-21

CHEMISTRY GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			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**	**8**	**10**	**450**	**350**	**800**

* Question paper will be of objective type. Students have to secure passing marks for eligibility, however marks will not be considered for award of Grade/Class/Rank.

SCHEME OF TEACHING AND EXAMINATION
B.E. II SEMESTER
2020-21

PHYSICS GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			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**

* Question paper will be of objective type. Students have to secure passing marks for eligibility, however marks will not be considered for award of Grade/Class/Rank.

SCHEME OF TEACHING AND EXAMINATION
B.E. II SEMESTER
2020-21

CHEMISTRY GROUP

Sl No.	Subject Code	Subject	Credits	Hours/Week			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**	**8**	**10**	**450**	**350**	**800**

* Question paper will be of objective type. Students have to secure passing marks for eligibility, however marks will not be considered for award of Grade/Class/Rank.

UMA161C: ENGINEERING MATHEMATICS-I

4 Credits (3-2-0)

UNIT-I

Differential Calculus-1 **L-10 Hrs, T-06 Hrs**

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 Hrs, T-08 Hrs**

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, Jacobian-problems, Errors and approximations

UNIT-III

Integral Calculus **L-10 Hrs,T-06 Hrs**

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 and volumes.

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

UNIT-IV

Vector Calculus **L-10 Hrs, T-06 Hrs**

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 Hrs, T-26 Hrs

Text Books

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. Dennis G Zill., Warren S Wright, Advanced Engineering Mathematics, 4th Edition, Jones & Bartlett India Pvt. Ltd, 2011.
3. E. Kreyszing: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books

1. Maurice D weir, Joel Hass and Frank R. Giordano, “Thomas calculus”, Pearson, eleventh edition, 2011.
2. James Stewart, Calculus: Early Transcendentals Cengage Learning, 2017.
3. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Vector Analysis: Schaum’s out line series by Spiegel Murray, McGraw Hill, 1974.

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

1. Solve various Engineering problems analytically using concepts of polar curvatures and Taylor’s series.
2. Solve various Engineering / physical problems use concepts of partial differentiation, Method of Lagrange multipliers, error and approximations.
3. Apply the concepts of multiple integrals and their usage in computing the area and volumes.
4. Apply beta and gamma concepts to solve engineering problems.
5. Apply the knowledge of differentiation of vectors to solve the engineering problems.
6. Exhibit the interdependence of line, surface and volume integrals.

Course Outcomes	Programme Outcome											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	-	-	-	-	-	-	-	-	-
CO6	2	-	-	-	-	-	-	-	-	-	-	-

UPH162C: ENGINEERING PHYSICS

4 Credits (3-2-0)

(EC, EE, EI, CS, IS AND AI BRANCHES)

UNIT-I

Quantum mechanics **L- 10 Hrs, T-6 Hrs**

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

Electrical properties of metals and semiconductors **L-10 Hrs, T-6 Hrs**

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 Hrs, T-6 Hrs**

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 mechanisms with derivations. Dielectric constant, 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 Hrs, T-8 Hrs**

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-Savart 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 Hrs, T-26 Hrs

Text Book

1. M.N.Avadhanulu, P.G.Kshirsagar and TVS Arun Murthy, "A Text book of Engineering Physics", 11th revised edition, S. Chand, 2019.

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", Third edition, S.Chand, 2010.
3. R.K.Gaur and S.L. Gupta, "Engineering Physics", Eighth edition, Dhanpat Rai, 2012.
4. W.H. Hayt and J.A. Buck, "Engineering Electromagnetics", Seventh edition, MGH, 2006.

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

1. Apply one dimensional Schrodinger's wave equation for computing physical properties of a material theoretically.
2. Analyse suitability of lasers for engineering applications.
3. Verify conductivity of metals and semiconductors theoretically and explain applications of conductors, semiconductors and superconductors.
4. Identify crystal structure of cubic crystals and explain physical properties and applications of dielectric materials.
5. Analyse suitability of electromagnetic waves and optical fibers for communication systems.
6. Identify the properties of ultrasonic waves and nanomaterials for engineering applications..

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1	-	1	-	-	-	1	1	-	1
CO2	3	2	1	-	1	1	1	1	1	1	-	1
CO3	3	2	1	-	1	-	-	-	1	1	-	1
CO4	3	2	1	-	1	-	-	-	1	1	-	1
CO5	3	2	1	-	1	1	1	-	1	1	-	1
CO6	3	2	1	-	1	1	1	1	1	1	-	1

UME163C/UME263C: ELEMENTS OF MECHANICAL ENGINEERING

3 Credits (2-2-0)

UNIT–I

Steam formation **L-7 Hrs, T-6 Hrs**

Introduction, Formation of steam, TS, TH 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

Introduction, 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 cycle gas turbine and close cycle gas turbine with schematic diagram & Comparison between open and close cycle gas turbine.

UNIT-II

Automobile Engineering **L-7 Hrs, T-6 Hrs**

Introduction, History and development of an automobile, Classification of automobiles, Layout of four wheelers (Layout diagram), Definition and working (function and block diagram), clutch, gear box & differential.

Internal Combustion Engines

Introduction, Classification of IC engines, Parts of IC engine, IC Engine nomenclature, Working of 4 stroke petrol and diesel engines. Comparison between SI and CI engines, Calculations: IP, BP, Mechanical efficiency, thermal efficiency, volumetric efficiency, specific fuel consumption, brake specific energy consumption, Problems of 4 stroke engine.

UNIT-III

Refrigeration and air- conditioning **L-7 Hrs, T-6 Hrs**

Introduction, Definition of Refrigeration, Principle of Refrigeration, Unit of Refrigeration (TR), Co-efficient of performance, Relative co-efficient of performance, Working of vapor compression refrigeration system (VCRS), Working of vapor absorption refrigeration system (VARS), Comparison between VCRS and VARS, Properties of good refrigerant. 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 and 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, Classification of lubricants classification of Bearings, working of Bush bearing, pedestal bearing, pivotal bearing, collar bearing and Antifriction bearing.

UNIT-IV

Power transmission **L-7 Hrs, T-6 Hrs**

Belt drive: 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, numerical problems.

Gear Drives

Types of gear drives, Nomenclature of Spur gear with sketch, Advantages of gear drive and disadvantages of Gear drives, Velocity ratio of Gear drives. Gear trains: Simple and Compound Gear trains numerical 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 Hrs, T-24 Hrs

Text Books

1. K. R. Gopalakrishna, Sudhir Gopalakrishna and S. C. Sharma "Elements of Mechanical Engineering" 29th edition, Subhas Publishers Bangalore, 2009.
2. S. Trymbaka Murthy, "Elements of Mechanical Engineering" 3rd edition, IK International, International Publishing House Pvt. Ltd., New Delhi 2010.

Reference Books

1. B. Agarwal and C. M. Agarwal, Basic Mechanical Engineering, Wiley, 2011
2. R. K. Rajput, "Automobile Engineering", Laxmi Publications, 2013.
3. T. R. Banga and S. C. Sharma, Industrial Engineering and Management, 11th edition, Khanna Publishers, 2013.

4. A. S. Ravindra, "Elements of Mechanical Engineering" 8th edition, Cengage Learning, 2011.

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

1. Apply th principles of thermodynamics to evaluate the properties of steam and explain the concepts of mechanical energy generation from the available natural source of energy.
2. Explain different types of IC engines, analyze and compute the performance parameters of an IC engine and identify the layouts of four wheeler with different parts of an automobile.
3. Differentiate the types of refrigeration systems and apply the knowledge of metal joining processes and bearings in various engineering application.
4. Apply the fundamental concepts of power transmission in real time applications and explain the basics of industrial engineering.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	1	-	1	2	1	-	-	2	-	2
CO2	3	2	2	1	1	1	2	1	3	1	-	1
CO3	3	2	1	1	1	1	2	1	1	1	1	1
CO4	2	2	1	-	1	1	1	1	1	1	1	1

UEE164C/UEE264C: BASIC ELECTRICAL ENGINEERING
3 Credits (2-2-0)
UNIT-I

Electromagnetism **L-06 Hrs, T-08 Hrs**

Series and parallel magnetic circuits, Comparison between magnetic and electric circuits.

Faradays laws, Lenz's law, Fleming's rules, statically and dynamically induced emf, Self and mutual inductance, coefficient of coupling, Energy stored in a magnetic field.

DC Circuits

KCL, KVL, Ohm's law, Mesh current and Node voltage Analysis.

UNIT–II

Single – Phase AC Circuits **L-07 Hrs, T – 06 Hrs**

Generation of sinusoidal voltages, Phase & phase difference of sinusoidal waveform, J-operator, Voltage and Current Relationships, Instantaneous and Average power in R, L, C, R-L, R-C & R-L-C series circuits, R-L-C Parallel circuits.

Transformer

Types, Construction and principle of operation, EMF equation, No load and On load operation, Losses and efficiency.

UNIT–III

Three Phase AC Circuits **L-07 Hrs, T-06 Hrs**

Generation of three phase AC voltage, Phase sequence, Voltage and Current relationship for star and delta connections, Advantages of three phase supply over single phase.

Measurement of power using two wattmeters (for balanced load), Expression for power factor in terms of wattmeter readings, Effect of power factor on wattmeter readings.

Generators

DC Generator: Construction, Principle of operation, emf equation, Types.

AC Generator: Types, Construction, Principle of operation, emf equation excluding Kp & Kd.

UNIT–IV

Motors **L-07 Hrs, T–06 Hrs**

DC Motor: Principle of operation, Back emf, Mechanical power developed, Torque equation, Types and Applications, Characteristics of motors, Necessity of starters, Three point starter.

AC Motor Types, Construction and principle of operation of three phase

induction motor, Production of rotating magnetic field, Frequency of rotor current, Slip, Torque equation, Torque slip characteristics, Applications, Star-Delta starter.

Electrical Wiring and Safety

Fuses, Necessity of Earthing, Types of Earthing

Electrical wiring, Calculation of energy consumption and billing

Total: L-27 Hrs, T-26 Hrs

Text Books

1. Edward Hughes, "Electrical and Electronic Technology", Pearson Publications, 10th Edition, 2010
2. B.L Theraja, "Fundamentals of Electrical Engineering and Electronics", S. Chand Publications, 27th Edition, 2008

Reference Books

1. Rajendra Prasad, "Fundamentals of Electrical Engineering", 2nd Edition, PHI Learning, 2009
2. V.N.Mittle & A.Mittal, "Basic Electrical Engineering", 2nd Edition, Tata McGraw- Hill Education, 2005
3. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", 2nd Edition, Pearson Publications, 2017

Course outcomes: After completion of the course, students shall be able to

1. Recall basics of magnetic circuits, electromagnetism, single phase & three phase circuits and electrical earthing.
2. Illustrate the laws of magnetic & electric circuits, concepts of single phase & three phase AC circuits, Operation of transformer and AC & DC machines, characteristics curves and domestic wiring practices.
3. Derive the expressions for statically & dynamically induced emfs, self and mutual inductances, power in AC series and parallel circuits.
4. Develop the emf equations for transformer, DC-AC generators and torque equations of DC motor and induction motors.
5. Calculate different parameters related to magnetic circuits, DC circuits, single phase & three phase AC circuits, AC & DC machines.
6. Apply the laws & theorems of magnetic and electric circuits to analyze & evaluate the circuit parameters.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-		-	-	-	-	-	-	-	-
CO3	3	2	-	1	-	-	-	-	-	-	-	-
CO4	3	3	-	1	-	-	-	-	-	-	-	-
CO5	3	3	-	2	-	-	-	-	-	-	-	-
CO6	3	3	-	3	-	-	-	-	-	-	-	-

UCS165C/UCS265C: PROGRAMMING WITH C

3 Credits (3-0-0)

UNIT-I

Introduction to Computer Science **L-10 Hrs**

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, Constants, 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, 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 conversion in expressions, Operator precedence and Associativity, Example programs.

Managing Input / Output operations

Formatted and Unformatted input/output statements, Example programs

UNIT-II

Decision making and Branching **L-10 Hrs**

Decision making with if, if-else, Nesting of if-else statements, else-if ladders, switch statement, ?: Operator, goto statement, Example programs.

Decision making and Looping

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 Hrs**

Introduction, Declaring and initializing string variables, String-handling functions, Example programs.

User defined functions

Introduction, Need for user-defined functions, a multi-function program, Elements of user defined function, Definition of functions, Return values and their types, Function calls, Function declaration, Category of functions, Nesting of functions, Recursion, Example programs.

UNIT-IV

Introduction to structures **L-10 Hrs**

Defining a structure, Declaring structure variables, Accessing structure members, Initialization, Copying and Comparing structure variables, Operations on individual members, Arrays of structure, Arrays within structures, Structures within structures, Example programs.

Pointers

Introduction, Accessing the address of a variable, Declaring and initialization of pointer variables, Pointers as function arguments, Example programs.
Command-line arguments.

Total: L-40 Hrs

Text Book

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw Hill Publications, 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, First Edition, PHI publications, 2002.
4. Morris Mano, Digital Logic and Computer Design, 2016.
5. Stephen Kochan, Programming in C, 4th Edition, 2014.
6. Mullish Cooper, The Spirit of C, Jaico Book Publishers, 2015.
7. Kernighan and Ritchie, C Programming Language, 2nd Edition, 1988, 49th Reprint, 2017.
8. 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 student will be able to

1. Comprehend the functioning of computer components and understand use of flowchart and algorithm.
2. Develop and debug C programs using decision making, branching and array.
3. Develop and debug C Programs using string and user defined function.
4. Develop and debug C Programs using structure, pointer.
5. Apply the learnt programming constructs to develop simple real-world applications.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	-	2	-	-	-	-	-	-	-	-	2
CO2	2	3	3	1	2	1	-	-	1	1	1	2
CO3	2	3	3	2	2	-	-	-	1	1	1	2
CO4	2	1	1	2	2	-	-	-	-	1	1	2
CO5	3	3	3	3	3	2	-	2	1	1	3	3

UHS126M/UHS226M: CONSTITUTION OF INDIA
(MANDATORY SUBJECT)

UNIT-I

Introduction to Constitution **L- 7 Hrs**

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

UNIT-II

Union Government **L-6 Hrs**

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

UNIT-III

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

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 Urban Local Self Govt. with special reference to74th Amendment.

UNIT-IV

Election provisions, Emergency provisions and Amendment of the constitution **L-6 Hrs**

Election Commission of India-composition, powers, functions and electoral process. Types of emergency-grounds, procedure, duration and effects. Amendment of the constitution- meaning, procedure and limitations.

Total: L-26 Hrs

Text Books

1. M. V. Pylee, "Introduction to the Constitution of India", 4th Edition, Vikas publication, 2005.
2. Durga Das Basu (DD Basu), "Introduction to the constitution of India", (Student Edition),19th edition, Prentice-Hall EEE, 2008.

Reference Book

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

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

1. Explain the significance of Indian Constitution as a fundamental law of the land.

2. Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
3. Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail
4. Demonstrate electoral Process, Emergency provisions and Amendment procedure.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	1	1	-	-	-	-	1
CO2	-	-	-	-	-	3	1	-	1	-	-	2
CO3	-	-	-	-	-	1	1	-	-	-	-	1
CO4	-	-	-	-	-	-	-	-	-	-	-	1

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. Identification of passive components and estimation of their values in a given black box.
5. Determination of rigidity modulus of a wire by torsional pendulum method.
6. Determination of Young's modulus of a metal strip by single cantilever method.
7. The study of characteristics of a laser.
8. Determination of wavelength of LEDs.
9. Measurement of velocity of ultrasonic waves in liquid by using ultrasonic interferometer.
10. Verification of Stefan's law.
11. Determination of specific heat of a solid or liquid using calorimeter.
12. Determination of viscosity of a liquid.
13. Measurement of numerical aperture and attenuation of an optical fiber.
14. The study of characteristics of a photodiode.
15. Determination of thermal conductivity of solid by Lee's and Charlton's method.
16. Determination of energy gap of semiconductor by four probe method.
17. Stirling engine working principle (Demonstration).

Note

1. Ten experiments are to be conducted.
2. The student has to perform one experiment during lab CIE Test.
3. The student has to perform two experiments during the SEE practical examinations.
4. Two virtual lab experiments are to be conducted.

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

1. Apply experimental skills for solving engineering problems.
2. Use measuring tools for precision measurements.
3. Measure properties of different materials.
4. Exhibit documentation skill in the form of experimental write-up.

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.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	-	-	1	-	1	-	1	-	-	-	1
CO2	3	-	-	-	-	1	-	1	-	-	-	1
CO3	3	1	-	-	1	1	1	1	-	-	-	1
CO4	1	-	-	-	-	-	-	1	1	1	-	1

UCS167L / UCS267L: C PROGRAMMING LABORATORY
1.5 Credits (0-0-3)

Minimum programs expected to be written and executed include :

PART - A

1. Program to demonstrate the use of C operators. (Four programs)
2. Programs to illustrate the application of branching statements. (Four programs)
3. Programs to employ the looping constructs. (Four programs)
4. Application programs based on arrays. (Four programs)

PART - B

5. Application Programs based on strings. (Four programs)
6. Demonstrate modular programming approach using functions. (Four programs)
7. Application Programs using structures. (Two programs)
8. Programs using pointers. (Two programs)

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

1. Design an algorithmic solution for a given problem.
2. Develop well-indented C program for a given algorithm, according to coding standards.
3. Debug and execute a given program.
4. Document the developed programming solution as per the standards.
5. Analyze a given problem and propose a solution

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.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2	2	2	2	-	-	-	-	-	-	-	2
CO2	2	3	3	2	2	1	-	-	-	-	2	2
CO3	2	2	3	3	2	-	-	-	2	-	2	2
CO4	2	2	2	2	1	-	-	-	-	2	2	2
CO5	2	2	3	3	2	2	-	2	2	2	-	2

UCH168C/UCH268C: ENGINEERING CHEMISTRY

4 Credits (3–2–0)

UNIT-I

Water Technology **L – 10 Hrs, T – 6 Hrs**

Introduction, sources, impurities and specifications of water, Boiler feed water - boiler problems, Scale and sludge formation, priming and foaming, boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$).

Chemical analysis of water: Standards for portable water, Determination of; Dissolved oxygen, Chlorides, Sulphates, TDS and numericals.

Water softening: Softening of water by ion exchange process. Desalination of sea water by reverse osmosis.

Self Study: BOD and its determination.

Electro Chemical Technology

Introduction, Origin of electrode potential, Nernst equation, concentration cell, numericals on Concentration cell, Reference electrode – Calomel electrode. Determination of single electrode potential using calomel electrode, Ion selective Electrode – Glass electrode, Determination of pH of the solution using glass electrode.

Energy storage devices: Introduction, Basic concept, Classification, Characteristics of batteries.

Construction and working of; 1) Nickel Metal hydride battery 2) Lithium ion batteries; i) Li-Air battery ii) Li-Cobalt oxide battery iii) Li-Sulphur battery

Self Study: Electrochemical Sensors & applications.

UNIT–II

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

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 coating methods.

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

Self study: Information on Multifunctional Coating

UNIT–III

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

Introduction, definition, Major environmental pollutants, Basic principles of green chemistry (12 principles). Various green chemical approaches – Microwave synthesis, Bio catalysed reactions, Phase transfer catalysis. Super critical conditions for solvent free reactions. Synthesis of typical organic compounds by conventional and green route; i) Adipic acid ii) Paracetamol.

Atom economy – Synthesis of Ethylene oxide & Methyl Methacrylate. Industrial applications of green chemistry, Numericals on Atom economy.

Self study: Information on recent green technology, green chemical products and application

Fuel Technology

Non Renewable Energy Sources

Introduction, Definition, classification, characteristics of fuel, Combustion, Calorific value- Definition, HCV, LCV, Determination of CV of solid/liquid fuel by Bomb calorimeter, numericals.

Renewable Energy Sources

Biofuel - Introduction, Classification of biofuels. 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.

Solar Energy – P.V.Cell; Introduction , Construction and Working of Typical P.V.Cell, Preparation of solar grade silicon by union carbide process, Advantages & Disadvantages of P.V.Cell.

Self study: Information on Wind Energy

UNIT–IV

Polymer materials **L – 10 Hrs, T – 6 Hrs**

Introduction, definitions, classification, polymerization types. Mechanism of polymerization-Cationic/Anionic polymerizations of styrene. Molecular weight of polymers- Number average and weight average methods, numericals. Glass transition temperature and factors affecting. Tg Synthesis, properties and applications of; i) Epoxy resin ii) Silicon rubber iii) PLA iv) PET.

Conducting polymers – Definition, Mechanism of conduction in polyacetylene and applications, Graphene – Introduction, Mechanism of conduction in graphene and applications.

Self study: Polymer membranes and their applications

Dyes

Introduction, definition, sensation of colour, classification based on applications of dyes. Theories of dyes- Wit theory, Electronic theory, Relationship of absorbed and visible colours. Synthesis, Properties and applications of; i) Azo dyes

Fluorescent dyes – Introduction, Classification, flurophores and their bio-Applications.

Self study: Information on food dyes with example and applications

Total: L-40 Hrs, T-26 Hrs

Text Books

1. Dr. Suba Ramesh etal., Engineering Chemistry, 2nd Edn., by Wiley India Pvt. Ltd., Delhi. 2011.
2. Shashi Chawla, A Text Book of Engineering Chemistry, 3rd Edn, by Dhantpat Rai & Co. Pvt., Pub. Delhi. 2003.

Reference Books

1. Dr. S. S. Dhara, Dr. S. S. Omare, Engineering Chemistry,12th Edn., by S.Chand & Company Ltd., 2010
2. Jain & Jain, Engineering Chemistry, 16th Edn., by Dhanapath Rai Pub. Co. 2013.
3. Kenneth Doxsee & James Huchison, Green organic Chemistry, 1st Edn., by Thomson-Brooks/Cole, 2004.
4. David M. Mousdale, Introduction to Bio fuels, 3rd Edn., byCRC Press,2017.

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

1. Apply and demonstrate quantitative chemical analysis and electrochemical analysis techniques and incorporate new methods to produce soft water for industrial and domestic use at cheaper cost.
2. Analyze engineering problems related to corrosion and develop/practice suitable preventive measures. Utilize surface modification methods to improve various cost effective properties of materials
3. Apply the principles of green chemistry in design and development of alternative ecofriendly chemical synthesis methods to minimize hazardous substances and impart the knowledge of conventional and

non-conventional energy sources and their effective management.

4. Acquire the knowledge of different polymer materials and dyes for wide variety of engineering applications.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	1	-	-	-	-	-	-	-	-	-	1
CO2	3	2	1	-	-	-	-	-	-	-	-	1
CO3	3	2	1	-	-	-	2	-	-	-	-	1
CO4	3	1	-	-	-	-	-	-	-	-	-	1

UEC169C/269C: BASIC ELECTRONICS
3 Credits (2-2-0)

UNIT-I

L – 07 Hrs, T – 06 Hrs

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 – 08 Hrs, T – 08 Hrs

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. Oscillator: 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 Hrs, T – 06 Hrs

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 Hrs, T–26 Hrs

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

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

1. Describe operation and characteristics of electronic devices.
2. Analyze basic electronic circuits containing diodes and transistors.
3. Compare and contrast different transistor biasing methods, open and closed loop systems, sensors and transducers.
4. Design rectifiers, regulators and oscillator circuits.
5. Use number system conversions and implement basic logic circuits.
6. Describe the necessity of communication systems and need for modulation.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1	-	1	-	-	-	-	-	-	1
CO2	3	2	1	-	1	-	-	-	-	-	-	1
CO3	3	2	1	-	1	-	-	-	-	-	-	1
CO4	3	2	1	-	-	1	-	-	-	-	-	1
CO5	3	2	1	-	-	-	-	-	-	-	-	1
CO6	3	2	1	-	-	-	-	-	-	-	-	1

UCV170C/UCV270C: ENGINEERING MECHANICS

3 Credits (2-2-0)

UNIT-I

Introduction **L-07 Hrs, T-08 Hrs**

Particle, continuum, rigid body, laws of motion, law of parallelogram of forces, classification of force system, resolution and composition of forces, principle of transmissibility. Resultant of co-planar concurrent force system, equilibrium of a particle, Lami's theorem, Numerical problems.

Moment and couple

Definition of moment, moment of a couple, characteristics of a couple, equivalent force and couple system, Varignon's theorem, resultant of coplanar nonconcurrent force system. Numerical problems.

UNIT-II

Support Reactions **L-07 Hrs, T-06 Hrs**

Types of beams, loads and supports. Support reaction of statically determinate beams subjected to various loads. Numerical problems.

Friction

Types of friction, laws of friction, limiting friction, angle of friction, angle of repose, impending motions on horizontal and inclined planes. Numerical problems.

UNIT-III

Centroid **L-07 Hrs, T-06 Hrs**

Definitions, locating centroid of a triangle, rectangle, circle, semi circle and quadrant of a circle using method of integration. Centroid of simple built up sections. Numerical problems.

Moment of Inertia

Moment of inertia of an area, polar moment of inertia, radius of gyration, perpendicular axis theorem and parallel axis theorem. Moment of inertia of triangle, rectangle, circle, semi circle and quadrant of a circle by method of integration. Moment of inertia of composite sections. Numerical problems.

UNIT-IV

Rectilinear motion **L-07 Hrs, T-06 Hrs**

Definitions, displacement, average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, rectilinear motion. Numerical problems.

Curvilinear motion

Definitions, motion along curvilinear path, projectile motion. Numerical Problems.

Total: L: 28 Hrs, T- 26 Hrs

Text Books

1. Ferdinand P. Beer & E. Russel Johnston Jr. "Mechanics for Engineers (Statics & Dynamics)", 9th Edition, Tata Mc Graw Hill Publications, New Delhi, 2011.
2. K.V. Rao & G.C. Raju " Elements of Civil Engineering & Mechanics" 1st Edition, Technical Publications, Pune, 2014.
3. S. S. Bhavikatti, "Engineering Mechanics" 5th Edition, New Age International Publishers, New Delhi, 2015.
4. R.C. Hibbeler, "Engineering Mechanics, Statics and Dynamics", 14th Edition, Pearson Prentice Hall Pearson Education, Inc. Hoboken, New Jersey 07030, 2016.

Reference Books

1. Timoshenko "Engineering Mechanics", 4th Edition, Mc Graw Hill Publications, New York, 1983.
2. Singer F.L. "Engineering Mechanics Statics and Dynamics", 3rd Edition, Horper and International, New York, 1975.
3. J. L. Meriam and L. G. Kraige, "Engineering Mechanics, Vol I and II ", 6th Edition, John Wiley, 2008.
4. N. H. Dubey, "Engineering Mechanics: Statics and Dynamics", McGraw-Hill Education 2015.

Course outcomes: After studying this course students are able to

1. Apply the knowledge of the mathematics, science and mechanics in day to day life.
2. Develop the confidence for self learning in application of equilibrium conditions for coplanar and non coplanar force systems.
3. Identify, formulate and analyze the bodies subjected to various external forces.
4. Use technical skills necessary for Engineering practice and hence, forming a base for further study of subjects like Mechanics of Materials.
5. Relate kinematics with kinetic equations on displacement, velocity and acceleration in rectilinear and curvilinear motion.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	-	-	-	-	-	-	-	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	-
CO3	1	1	-	-	-	-	-	-	-	-	-	-
CO4	1	1	-	-	-	-	-	-	-	-	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-	-

UBT133M/233M: ENVIRONMENTAL STUDIES
(MANDATORY SUBJECT)
UNIT-I

Environment & Ecology **L:07 Hrs**

Environmental segments, Ecosystem and classification of ecosystem.

Environmental Impacts of human activities : Agriculture, Transportation, Industry, Mining, Urbanization.

Natural Resources

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

Renewable Energy: Solar energy, wind energy, Hydropower, Tidal energy, Ocean thermal energy, Geo thermal energy, Biomass energy, Biogas, Biofuels, Hydrogen as fuel.

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

UNIT-II

Environmental Pollution **L: 07 Hrs**

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. Environmental education, conservation of resources. Environment economics – concept of green building, Clean Development Mechanism (CDM).

UNIT-III

Current Environmental Issues of concern **L: 06 Hrs**

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 Hrs**

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, plastic, chemical, E–waste, food & construction industry waste management).

Total: L-26 Hrs

Text Books

1. Benny Joseph "Environmental Studies" Tata McGraw Hill, 2005.
2. Dr. D. L. Manjunath, "Environmental Studies" Pearson Education, 2006
3. Koushik and Koushik "Environmental Science & Engineering" New Age International Publishers, New Delhi, 2006

Reference Books

1. P. Venugopal Rao "Principles of Environmental Science & Engineering" Prentice Hall of India, 2006.
2. Meenakshi "Environmental Science & Engineering" Prentice 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: Students will be able

1. To identify basic aspects of environment and ecology.
2. To recognize natural resources and its uses.
3. To illustrate types of pollution and its effects on environment.
4. To demonstrate the concept of sustainable development.
5. To apply knowledge of environmental protection acts in various societal concerns.
6. To apply the waste management techniques in various fields.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	1	3	-	-	-	-	3
CO2	-	1	-	-	-	2	3	-	-	-	-	3
CO3	2	-	-	-	-	-	3	-	-	-	-	3
CO4	-	2	-	-	-	2	2	-	-	-	-	3
CO5	-	-	-	1	-	2	2	1	-	-	-	3
CO6	3	-	2	2	-	-	2	-	-	-	-	3

UME171L/UME271L: COMPUTER AIDED ENGINEERING GRAPHICS

2.5 CREDITS (1-0-3)

Projection of points: Projection 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 principle planes.

Projections of planes

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

Projections of solids

Projection of solids (Prisms, pyramids, cones and Cylinders) resting on HP, axis/base inclined to HP and profile views.

Development of solids

Development of lateral surface of prisms, pyramids, Cones and Cylinders cut by auxiliary inclined planes.

Isometric Projection

Isometric Projection of Prisms, Pyramids, Cones and Cylinders, Combinations of solids (Maximum of two solids Co-Axial only)

Text Books

1. K.G.Gopalkrishan, ''Engineering Drawing'', vol. I and II, 23rd edition, Subhas Publishers, 2014.
2. R.K.Hegde and Niranjan Murthy, ''Engineering Graphics''1st edition, Sapna Publications , 2003.

Reference Books

1. K.R.Gopalkrishna,''Engineering Graphics'', 30th edition, Subhas Publishers, 2003.
2. N.D.Bhat, "Engineering Drawings"
3. P.I.Varghese, ''Engineering Graphics'', Mc. Graw Hill, 2013.

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

1. Understand the concepts of the position and views of Points and lines in quadrants and make them to draw in orthographics views.
2. Drew the different shapes of planes with different orientations.

3. Construct different solids with different positions and understand the respective views.
4. Develop the ability of understanding the lateral surfaces of various solids.
5. Visualize and draw orthographic view and isometric view.

Laboratory Assessment

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

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

(3) 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.

(4) 50% weightage is given to sketch and 50% is given to printouts.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	3	3	1	3	1	-	-	2	2	-	2
CO2	3	3	3	1	3	2	-	-	2	2	-	1
CO3	3	3	3	1	3	1	-	-	3	3	-	2
CO4	3	3	3	1	3	3	-	-	3	3	-	3
CO5	3	3	3	1	3	3	-	-	3	3	-	3

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 the given solution using standard $K_2Cr_2O_7$ solution.
3. Determination of pKa of a weak acid by standard NaOH using pH meter.
4. Conductometric estimation of HCl & CH_3COOH in acid mixture by Standard NaOH.
5. Colorimetric estimation of copper in the given solution.

PART – B

6. Preparation standard solution and Standardization of a given solution.
7. Determination of total hardness of a given water sample by EDTA method.
8. Determination of amount of CaO in the cement solution by EDTA method.
9. Determination of alkalinity of water sample by duel indicator method.
10. Determination of amount of Fe in a given solution using standard $K_2Cr_2O_7$ solution.

Reference Books

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

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

1. Write systematic procedure for setting up and conduct of experiment.
2. Perform experiment on volumetric analysis of materials of social relevance Individually along with interpretation of results of analysis and calculation.
3. Perform experiments using instruments for chemical analysis with high accuracy.
4. Incorporate the practical skills of chemistry for engineering applications.

Laboratory Assesment

CIE for Practical

- 30 marks for regular lab conduction and journal write up for 10 experiments **(10x3=30)**

- 20 marks for Lab CIE Test (5 marks for write up, 5 marks for viva &10 marks for estimation.)

SEE for Practical

1. Minimum 9 experiments should be completed to get eligibility for SEE practical examination conducted for 3 hours duration for 50 marks
2. For Semester End Examination, one experiment from Part -A & one from Fart-B shall be set.
3. Different experiments may be set under Part - A & Common experiment from Part-B.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1
CO3	3	2	-	-	-	-	-	-	-	-	-	1
CO4	3	2	-	-	-	-	-	-	-	-	-	1

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 : The student will be able to

1. Demonstrate the importance of Interdisciplinary nature of engineering disciplines.
2. Demonstrate the fundamentals of various engineering fields.
3. Analyse the applications of various techniques involved in Engineering
4. Appreciate and solve problems related to societal needs.

Laboratory assessment

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

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	1	-	1	1	-	-	1	-	-	2
CO2	3	1	1	-	2	2	-	-	1	-	-	1
CO3	3	3	1	-	2	1	-	-	1	-	-	2
CO4	3	1	1	-	-	3	-	-	1	-	-	2

UMA261C: ENGINEERING MATHEMATICS-II

4 Credits (3-2-0)

UNIT – I

Elementary Linear Algebra **L-10 Hrs, T-06 Hrs**

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 Hrs, T-08 Hrs**

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 Hrs, T-06 Hrs**

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 Transform **L-10 Hrs, T-06 Hrs**

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 Hrs, T-26 Hrs

Text Books

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. Dennis G Zill., Warren S Wright, Advanced Engineering Mathematics, 4th Edition, Jones & Bartlett India Pvt. Ltd, 2011.
3. E. Kreyszing: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books

1. Maurice D weir, Joel Hass and Frank R. Giordano, “Thomas calculus”, Pearson, eleventh edition, 2011.
2. Calculus: Early Transcendental SJames Stewart, Cengage Learning, 2017.
3. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Anton Bivens and Davis, “Calculus “, wiley student edition, 7th edition, 2010.

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

1. Solve systems of linear equations with different methods in linear algebra.
2. Solve first order linear equations and nonlinear equations of certain types and interpret the solutions.
3. Solve second and higher order linear differential equations with constant coefficients.
4. Solve PDE by direct integration method of separation of variables and Lagrange’s method.
5. Derive heat, wave equation and solve by the method of separation of variables.
6. Apply Laplace transforms and inverse transforms for standard functions and to solve differential equations.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	2	-	-	-	-	-	-	-	-		-
CO2	1	2	-	-	-	-	-	-	-	-		-
CO3	1	-	-	-	-	-	-	-	-	-		-
CO4	1	-	-	-	-	-	-	-	-	-		-
CO5	1	-	-	-	-	-	-	-	-	-		-
CO6	1	2	-	-	-	-	-	-	-	-		-

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

Vector mechanics **L-10 Hrs, T-6 Hrs**

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. Introduction to matrices and tensors. Numerical problems.

Electrical properties of metals

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.

UNIT-II

Crystal structure **L-10 Hrs, T-6 Hrs**

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 mechanisms with derivations. Dielectric constant, 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 Hrs, T-8 Hrs**

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, surface tension, capillarity, vapor pressure. Fluid pressure at a point. Pascal's law with proof. Numerical problems.

UNIT-IV

Lasers **L-10 Hrs, T-6 Hrs**

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 Hrs, T-26 Hrs

Text Book

1. M. N. Avadhanulu, P.G.Kshirsagar and TVS Arun Murthy, "A Textbook of Engineering Physics", 11th revised edition, S. Chand, 2019.

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. R.K. Bansal, "A textbook of Fluid Mechanics", Laxmi, 2012.
5. R.K. Gaur and S.L. Gupta, "Engineering Physics", Dhanpat Rai, 2012.

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

1. Apply vector mechanics for solving engineering problems.
2. Verify conductivity of metals theoretically
3. Identify crystal structure of cubic crystals and explain physical properties and applications of dielectric materials.
4. Apply basics of thermodynamics and fluid mechanics for solving engineering problems.
5. Analyse suitability of lasers for engineering applications.
6. Identify the properties of ultrasonic waves and nanomaterials for engineering applications.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1	-	-	1	1	-	1	1	-	1
CO2	3	2	1	-	-	-	-	-	1	1	-	1
CO3	3	2	1	-	-	-	-	-	1	1	-	1
CO4	3	2	1	-	-	1	1	-	1	1	-	1
CO5	3	2	1	-	1	1	1	1	1	1	-	1
CO6	3	2	1	-	1	1	1	1	1	1	-	1

UHS174K/UHS274K: ENGLISH FOR ENGINEERS
(Compulsory Subject)

1. Vocabulary Building **L-6 Hrs**

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 **L-6 Hrs**

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 **L-7 Hrs**

3.1 Reading comprehension and composition.

3.2 Precis writing (The art of condensation).

3.3 Techniques of essay writing with appropriate use of linkers.

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 **L-7 Hrs**

(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/telephonic) presentation skills.

4.4 Introduction to Phonetics: Intonation, Pronunciation, Rhythm, Stress, Syllable and Structures.

4.5 Workplace communication:

Group discussions, cross-cultural behaviour, job interviews.

Total: L-26 Hrs

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 Pvt 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: The Students will be able to

1 Communicate proficiently with engineering community and society at large.
2. Comprehend and write effective technical reports and proposals.
3. Make effective class room presentation.
4. Give and receive clear instructions while conducting Group Discussion.
5. Engage in independent and life-long learning as the technology changes.

Course Outcomes	Programme Outcomes											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	-	-	-	-	-	-	-	3	-	**3**	-	-
CO2	-	-	-	-	-	-	-	-	-	**3**	-	-
CO3	-	-	-	-	-	-	-	-	-	**3**	-	-
CO4	-	-	-	-	-	-	-	-	3	**3**	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-	**3**

Question Paper Pattern for Core Subjects

CIE

1. Question paper consists of two parts viz., part A and part B.
2. Part A is compulsory and will consist of 10 questions each of one mark or 5 questions each of two marks or a combination of one and two marks totaling to 10 marks.
3. Part B will consist of 2 units. Two questions from each unit uniformly covering the syllabus of the unit under consideration Each question will carry 15 marks and should not have more than 3 sub divisions. Any one full question to be answered from each unit.
4. Each CIE test will be for a total of 40 marks then reduced to 20 marks.

SEE

1 Question paper consists of two parts viz., part A and part B.
2. Part A is compulsory and will consist of 20 questions of each one mark or 10 questions of each two marks or a combination of one and two marks totaling to 20 marks.
3. Part B will consist of 4 units. Two questions from each unit uniformly covering the syllabus of the unit under consideration Each question will carry 20 marks and should not have more than 4 sub divisions. Any one full question to be answered from each unit.
4. The SEE will be for a total of 100 marks then reduced to 50 marks.

Question Paper Pattern for Mandatory Subjects

CIE

1. Each CIE test consist of 40 multiple choice questions of one mark each from 2 units uniformly covering the entire syllabus.
2. Each CIE test will be for a total of 40 marks then reduced to 20 marks.

SEE

1. SEE question paper will consist of 50 multiple choice questions of 1 mark each covering entire syllabus.