Chemistry Cycle Syllabus

I/II Semester

2017 VTU CBCS

ENGINEERING CHEMISTRY

ENGINEERING MATHEMATICS-I

ENGINEERING MATHEMATICS-II

COMPUTER AIDED ENGINEERING DRAWING

PROGRAMMING IN C AND DATA STRUCTURES

ENVIRONMENTAL STUDIES

BASIC ELECTRONICS

COMPUTER PROGRAMMING LABORATORY

ENGINEERING CHEMISTRY LABORATORY

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018

I SEMESTER B.E./B.TECH (CHEMISTRY GROUP)

Sl. No.	Subject Code	Subject	Teaching Department	Board	Theory /Lab/ Drawing (Hrs/ Week)	Examination Marks			Credits
						Th./Pr.	I.A.	Total	
1	17MAT11	Engineering Maths-I	Mathematics	Basic Sc.	4 (T)	80	20	100	4
2	17CHE12	Engineering Chemistry	Chemistry	Basic Sc.	4 (T)	80	20	100	4
3	17PCD13	Programming in C & Data Structures	Any Engineering Department	CSE	4 (T)	80	20	100	4
4	17CED14	Computer Aided Engineering Drawing	Mech./IP/Auto/ Mfg.Engg./ IEM	Mech. Engg.	6 (2I+ 4P)	80	20	100	4
5	17ELN17	Basic Electronics	E & C / E & E / TC / IT	E & C	4 (T)	80	20	100	4
6	17CPL16	Computer Programming Lab	Any Engineering Department	CSE	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
7	17CHEL17	Engg. Chemistry Lab	Chemistry	Basic Sci.	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
8	17CIV18	Environmental Studies (Audit Course)	Civil / Environmental	Civil	1 (Tutorial)	40	10	50	--
Total					29	600	150	750	24

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM
CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018

II SEMESTER B.E./B.TECH (CHEMISTRY GROUP)

Sl. No.	Subject Code	Subject	Teaching Department	Board	Theory /Lab/ Drawing (Hrs/ Week)	Examination Marks			Credits
						Th./Pr.	I.A.	Total	
1	17MAT21	Engineering Maths-II	Mathematics	Basic Sc.	4 (T)	80	20	100	4
2	17CHE22	Engineering Chemistry	Chemistry	Basic Sc.	4 (T)	80	20	100	4
3	17PCD23	Programming in C & Data Structures	Any Engineering Department	CSE	4 (T)	80	20	100	4
4	17CED24	Computer Aided Engineering Drawing	Mech./IP/Auto/ Mfg.Engg./ IEM	Mech. Engg.	6 (2I+ 4P)	80	20	100	4
5	17ELN25	Basic Electronics	E & C / E & E / TC / IT	E & C	4 (T)	80	20	100	4
6	17CPL26	Computer Programming Lab	Any Engineering Department	CSE	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
7	17CHEL27	Engg. Chemistry Lab	Chemistry	Basic Sc.	3(2 hrs lab+ 1 hr Tutorial)	80	20	100	2
8	17CIV28	Environmental Studies (Audit Course)	Civil / Environmental	Civil	1 (Tutorial)	40	10	50	-
Total					29	600	150	750	24

ENGINEERING CHEMISTRY

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Subject Code	17CHE12/17CHE22	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course objectives:

To provide students with knowledge of engineering chemistry for building technical competence in industries, research and development in the following fields

- Electrochemistry & Battery Technology.
- Corrosion & Metal Finishing.
- Fuels & Solar energy.
- Polymers.
- Water Technology & Nano Materials.

Module -1	**Teaching Hours**
Electrochemistry and Battery Technology **Electrochemistry**: Introduction, Derivation of Nernst equation for electrode potential. Reference electrodes: Introduction, construction, working and applications of calomel and Ag / AgCl electrodes. Measurement of electrode potential using calomel electrode. Ion selective electrode: Introduction; Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrolyte concentration cells, numerical problems. **Battery Technology:** Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle	**10 hours**

life and shelf life. Construction, working and applications of Zinc-Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries. **Fuel Cells**: Introduction, difference between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte.	
Module -2	
Corrosion and Metal Finishing: **Corrosion**: Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity, and temperature. Types of corrosion- Differential metal, differential aeration (Pitting and water line) and stress. Corrosion control: Inorganic coatings-Anodizing of Al and phosphating; Metal coatings-Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods). **Metal Finishing:** Introduction, Technological importance. Electroplating: Introduction, principles governing-Polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit-current density, concentration of metal ion & electrolyte; pH, temperature & throwing power of plating bath; additives- brighteners, levellers, structure modifiers & wetting agents. Electroplating of Nickel (Watt's Bath) and Chromium(decorative and hard). Electro less plating: Introduction, distinction between electroplating and electro less plating, electro less plating of copper & manufacture of double sided Printed Circuit Board with copper.	**10hours**
Module - 3	

Fuels and Solar Energy: **Fuels**: Introduction, classification, calorific value- gross and net calorific values, determination of calorific value of fuel using bomb calorimeter, numerical problems. Cracking: Introduction, fluidized catalytic cracking, synthesis of petrol by Fishcher-Tropsch process, reformation of petrol, octane and cetane numbers. Gasoline and diesel knocking and their mechanism, anti knocking agents, power alcohol & biodiesel. **Solar Energy:** Introduction, utilization and conversion, photovoltaic cells- construction and working. Design of PV cells: modules, panels & arrays. Advantages & disadvantages of PV cells. Production of solar grade silicon: Union carbide process, purification of silicon (zone refining), doping of silicon-diffusion technique (n&p types).	**10 hours**
Module - 4	
Polymers: Introduction, types of polymerization: addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Molecular weight of polymers: number average and weight average, numerical problems. Glass transition temperature (T_g): Factors influencing T_g-Flexibility, inter molecular forces, molecular mass, branching & cross linking and stereo regularity. Significance of T_g. Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Synthesis, properties and applications of PMMA (plexi glass), Polyurethane and polycarbonate. Elastomers: Introduction, synthesis, properties and applications of Silicone rubber. Adhesives: Introduction, synthesis, properties and applications of epoxy resin. Polymer Composites: Introduction, synthesis, properties and applications of Kevlar. Conducting polymers: Introduction, mechanism of conduction in Poly aniline and applications of conducting poly aniline.	**10 hours**

Module-5	
Water Technology and Nanomaterials: **Water Technology:** Introduction**,** boiler troubles with disadvantages & prevention methods-scale and sludge formation, priming and foaming, boiler corrosion(due to dissolved O_2, CO_2 and $MgCl_2$). Determination of DO, BOD and COD, numerical problems on COD. Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis & electro dialysis (ion selective).. **Nano Materials:** Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation & chemical vapour condensation processes). Nano scale materials- carbon nano tubes, nano wires, fullerenes, dendrimers, nano rods, & nano composites.	**10 hours**

Course outcomes:

On completion of this course, students will have knowledge in:

- Electrochemical and concentration cells. Classical & modern batteries and fuel cells.
- Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electro less plating.
- Production & consumption of energy for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy.
- Replacement of conventional materials by polymers for various applications.
- Boiler troubles; sewage treatment and desalination of sea water, and
- Over viewing of synthesis, properties and applications of nanomaterials.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions(with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books:

1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah & Pushpa Iyengar., **"Chemistry for Engineering Students"**, Subhash Publications, Bangalore.
2. R.V.Gadag & A.Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi.
3. P.C.Jain & Monica Jain.,**"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi.

Reference Books:

1. O.G.Palanna,**"Engineering Chemistry"**,Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.
2. G.A.Ozin & A.C. Arsenault, **"Nanochemistry A Chemical Approach to Nanomaterials"**, RSC publishing, 2005.
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition.
4. V.R.Gowariker, N.V.Viswanathan & J.Sreedhar., **"Polymer Science"**, Wiley-Eastern Ltd.
5. M.G.Fontana., **"Corrosion Engineering"**, Tata McGraw Hill Publishing Pvt. Ltd. New Delhi.

ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Subject Code	17MAT11	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

- n^{th} derivatives of product of two functions and polar curves.
- Partial derivatives
- Vector calculus
- Reduction formulae of integration; To solve First order differential equations.
- Solution of system of linear equations , quadratic forms.

Module - 1	**Hours – 10**
Differential Calculus -1: determination of n^{th} order derivatives of Standard functions - Problems. Leibnitz's theorem (without proof) - problems. **Polar Curves** - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms (without proof) -problems	
Module -2	

Differential Calculus -2 Taylor's and Maclaurin's theorems for function of one variable(statement only)- problems. Evaluation of Indeterminate forms. **Partial derivatives** – Definition and simple problems, Euler's theorem(without proof) – problems, total derivatives, partial differentiation of composite functions-problems. Definition and evaluation of Jacobians	**Hours - 10**
Module – 3	
Vector Calculus: Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Definition of Gradient, Divergence and Curl-problems. Solenoidal and Irrotational vector fields. Vector identities - div(ϕA), curl (ϕA), curl(grad ϕ), div(curl A).	**Hours - 10**
Module-4	
Integral Calculus: Reduction formulae - $\int Sin^n x\,dx, \int Cos^n x\,dx, \int Sin^m x\,Cos^n x\,dx,$ (m and n are positive integers), evaluation of these integrals with standard limits (0 to π/2) and problems. **Differential Equations** ; **Solution of first order and first degree differential equations** – Exact, reducible to exact and Bernoulli's differential equations .Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.	**Hours - 10**
Module-5	

Linear Algebra	**Hours - 10**
Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. Linear transformation, diagonalisation of a square matrix . Reduction of Quadratic form to Canonical form	

Course outcomes:

On completion of this course, students are able to

- Use partial derivatives to calculate rates of change of multivariate functions.
- Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.
- Recognize and solve first-order ordinary differential equations, Newton's law of cooling
- Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions(with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books:

1. B.S. Grewal, "**Higher Engineering Mathematics**", Khanna publishers, 42nd edition, 2013.

2. Erwin Kreyszig, "**Advanced Engineering Mathematics**I, Wiley, 2013

Reference Books:

1. B.V. Ramana, "**Higher Engineering Mathematics**", Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, "**A text book of Engineering mathematics"**, Laxmi publications, latest edition.
3. H.K. Dass and Er. RajnishVerma, "**Higher Engineerig Mathematics**", S.Chand publishing, 1st edition, 2011.

ENGINEERING MATHEMATICS-II

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Subject Code	17MAT21	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course objectives:

To enable students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following'

- Ordinary differential equations
- Partial differential equations
- Double and triple integration
- Laplace transform

Module – I	**Teaching Hours**
Linear differential equations with constant coefficients: Solutions of second and higher order differential equations - inverse differential operator method, method of undetermined coefficients and method of variation of parameters.	**10 Hours**
Module -2	
Differential equations-2: **Linear differential equations with variable coefficients:** Solution of Cauchy's and Legendre's linear differential equations. **Nonlinear differential equations** - Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions, Clairauit's equations and equations reducible to Clairauit's form.	**10 Hours**

Module – 3	
Partial Differential equations: Formulation of Partial differential equations by elimination of arbitrary constants/functions, solution of non-homogeneous Partial differential equations by direct integration, solution of homogeneous Partial differential equations involving derivative with respect to one independent variable only. Derivation of one dimensional heat and wave equations and their solutions by variable separable method.	**10 Hours**
Module-4	
Integral Calculus: **Double and triple integrals:** Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. Application of double and triple integrals to find area and volume. **. Beta and Gamma functions:** definitions, Relation between beta and gamma functions and simple problems.	**10 Hours**
Module-5	
Laplace Transform Definition and Laplace transforms of elementary functions. Laplace transforms of $e^{at}f(t)$, $t^n f(t)$ *and* $\frac{f(t)}{t}$ (without proof) , periodic functions and unit-step function- problems **Inverse Laplace Transform** Inverse Laplace Transform - problems, Convolution theorem to find the inverse Laplace transforms(without proof) and problems, solution of linear differential equations using Laplace Transforms.	**10 Hours**

Course outcomes:

On completion of this course, students are able to,

- solve differential equations of electrical circuits, forced oscillation of mass spring and elementary heat transfer.
- solve partial differential equations fluid mechanics, electromagnetic theory and heat transfer.
- Evaluate double and triple integrals to find area , volume, mass and moment of inertia of plane and solid region.
- Use curl and divergence of a vector valued functions in various applications of electricity, magnetism and fluid flows.
- Use Laplace transforms to determine general or complete solutions to linear ODE

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions(with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books:

- B. S. Grewal," Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.
- Kreyszig, "Advanced Engineering Mathematics " - Wiley, 2013

Reference Books:

- B.V.Ramana "Higher Engineering M athematics" Tata Mc Graw-Hill, 2006
- N P Bali and Manish Goyal, "A text book of Engineering mathematics" , Laxmi publications, latest edition.

  H. K Dass and Er. Rajnish Verma ,"Higher Engineerig Mathematics", S. Chand publishing,1st edition, 2011.

COMPUTER AIDED ENGINEERING DRAWING

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Subject Code	17CED14/17CED24	IA Marks	20
Number of Lecture Hours/Week	6 (2T + 4L)	Exam Marks	80
Total Number of Lecture Hours	84	Exam Hours	03

CREDITS - 04

Course objectives:

Engineering drawing is an important tool for all Engineers and for many others professionals. It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it.

The aim of the subject is to equip students with the fundamentals of Computer Aided Engineering Drawing and to further the ability to communicate information by graphical means.

Module -1	**Teaching Hours**

Introduction to Computer Aided Sketching	**06 Hours**
Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. of HP, VP, RPP & LPP. of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering.	
Module -2	**Teaching Hours**
Orthographic projections Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems). Orthographic Projections of Plane Surfaces (First Angle Projection Only) Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates).	**20Hours**
Module-3	

Projections of Solids (First angle Projection only) Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on octahedrons and combination solid).	**28 Hours**
Module-4	
Sections And Development of Lateral Surfaces of Solids Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on sections of solids) Development of lateral surfaces of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).	**15Hours**
Module-5	
Isometric Projection (Using Isometric Scale Only) Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three solids).	15 Hours
Course outcomes: After studying this course, 1. Students will be able to demonstrate the usage of CAD software. 2. Students will be able to visualize and draw Orthographic projections, Sections of solids and Isometric views of solids. 3. Students are evaluated for their ability in applying various concepts to solve practical problems related to engineering drawing.	

Question paper pattern:

1. Module -1 is only for practice and Internal Assessment and not for examination.
2. Question paper for each batch of students will be sent online by VTU and has to be downloaded before the commencement of Examination of each batch. The answer sheets will have to be jointly evaluated by the Internal & External examiners.
3. A maximum of **THREE** questions will be set as per the following pattern *(No mixing of questions from different Modules).*

Q. No.	From Chapters	Marks Allotted
1	Module 2(Choice between (Points+Lines or Planes)	25
2	Module 3	30
3	Module 4 or Module 5	25
Total		80

Q. No.	Solutions and Sketching in the Graph Book	Computer Display and Printout	Total Marks
1	10	15	25
2	12	18	30
3	13	12	25
Total Marks	35	45	80

Students have to submit the computer printouts and the sketches drawn on the graph sheets at the end of the examination. Both Internal & External examiners have to jointly evaluate the solutions (sketches) and computer display & printouts of each student for 80 marks (35 marks for solutions & sketches + 45 marks for computer display and printouts) and submit the marks list along with the solution (sketches) on graph sheets & computer printouts in separate covers.

4. Each batch must consist of a minimum of 10 students and a maximum of 12 students.
5. Examination can be conducted in parallel batches, if necessary.

Text Books:

1) **Engineering Drawing** - N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat.

2) "**Computer Aided Engineering Drawing**" by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers.

Reference Books:

1) Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006.

2) Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.

3) Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.

4) A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.

PROGRAMMING IN C AND DATA STRUCTURES
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Subject Code	17PCD13/23	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course objectives:

The objectives of this course is to make students to learn basic principles of Problem solving, implementing through C programming language and to design & develop programming skills. To gain knowledge of data structures and their applications.

Module -1 : INTRODUCTION TO C LANGUAGE	**Teaching Hours**
Pseudo code solution to problem, Basic concepts in a C program, Declaration, Assignment & Print statements, Data Types, operators and expressions etc, Programming examples and exercise. **Text 1:** Chapter 2, **and** **Text 2:** 1.1, 1.2, 1.3	**10Hours**
Module -2: BRANCHING AND LOOPING	
Two way selection (if, if-else, nested if-else, cascaded if-else), switch statement, ternary operator? Go to, Loops (For, while-do, do-while) in C, break and continue, Programming examples and exercises. **Text 1:** Chapter 3**.** **&** **Text 2:** 4.4.	**10 Hours**
Module – 3: FUNCTIONS, ARRAYS AND STRINGS	
ARRAYS AND STRINGS: Using an array, Using arrays with Functions, Multi-Dimensional arrays. String: Declaring, Initializing, Printing and reading strings, string manipulation functions, String input and output functions, array of strings, Programming examples and Exercises. **Text 1:** 5.7, & **Text 2**: 7.3, 7.4, chapter 9 **FUNCTIONS**: Functions in C, Argument Passing – call by value, call by reference, Functions and program structure, location of functions, void and parameter less Functions, Recursion, Programming examples and exercises. **Text 1:** 1.7, 1.8, Chapter 4. **Text 2:** 5.1 to 5.4.	**10 Hours**

Module-4: STRUCTURES AND FILE MANAGEMENT	
Basic of structures, structures and Functions, Array of structures, structure Data types, type definition, Defining, opening and closing of files, Input and output operations, Programming examples and exercises. **Text 1:** 6.1 to 6.3. **Text 2**: 10.1 to 10.4, Chapter 11.	**10 Hours**
Module-5: POINTERS AND PREPROCESSORS & Data Structures	
Pointers and address, pointers and functions (call by reference) arguments, pointers and arrays, address arithmetic, character pointer and functions, pointers to pointer ,Initialization of pointer arrays, Dynamic memory allocations methods, Introduction to Preprocessors, compiler control Directives, Programming examples and exercises. **Text 1:** 5.1 to 5.6, 5.8. **Text 2: 12.2,** 12.3**, 13.1 to 13.7**. **Introduction to Data Structures**: Primitive and non primitive data types, Abstract data types, Definition and applications of Stacks, Queues, Linked Lists and Trees. **Text 2 : 14.1, 14.2, 14.11, 14.12, 14.13, 14.15, 14.16, 14.17, 15.1**.	**10 Hours**

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

- Achieve Knowledge of design and development of C problem solving skills.
- Understand the basic principles of Programming in C language
- Design and develop modular programming skills.
- Effective utilization of memory using pointer technology
- Understands the basic concepts of pointers and data structures.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions(with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books:

1. Brian W. Kernighan and Dennis M. Ritchie: The C Programming Language, 2nd Edition, PHI, 2012.
2. Jacqueline Jones & Keith Harrow: Problem Solving with C, 1st Edition, Pearson 2011.

Reference Books:

1. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.
2. R S Bichkar, Programming with C, University Press, 2012.
3. V Rajaraman: Computer Programming in C, PHI, 2013.

ENVIRONMENTAL STUDIES

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Subject Code	17CIV18/17CIV28	IA Marks	10
Number of Lecture Hours/Week	02	Exam Marks	40
Total Number of Lecture Hours	25	Exam Hours	02

Course Objectives:

1. **To identify the major challenges in environmental issues and evaluate possible solutions.**
2. **Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.**
3. **To analyze an overall impact of specific issues and develop environmental management plan.**

Module - 1

Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, And Economic & Social Security. **2 Hours**

Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation Environmental Impact Assessment, Sustainable Development. **3 Hours**

Module - 2

Natural Resources, Water resources – Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water Mineral resources, Forest Wealth Material Cycles – Carbon Cycle, Nitrogen Cycle & Sulphur Cycle. **2 Hours**

Energy – Different types of energy, Conventional sources & Non Conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy. **3 Hours**

Module -3

Environmental Pollution – Water Pollution, Noise pollution, Land Pollution, Public Health Aspects. **2 Hours**

Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Waste Water Management. **3 Hours**

Module -4

Air Pollution & Automobile Pollution: Definition, Effects – Global Warming, Acid rain & Ozone layer depletion, controlling measures. **3 Hours**

Solid Waste Management, E - Waste Management & Biomedical Waste Management - Sources, Characteristics & Disposal methods. **2 Hours**

Module - 5

Introduction to GIS & Remote sensing, Applications of GIS & Remote Sensing in Environmental Engineering Practices. **2 Hours**

Environmental Acts & Regulations, Role of government, Legal aspects, Role of Non-governmental Organizations (NGOs) , Environmental Education & Women Education. **3 Hours**

Course Outcome:

Students will be able to,

1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment,
3. Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components
4. Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues

Text Books:

1. Benny Joseph (2005), **"Environmental Studies"**, Tata McGraw – Hill Publishing Company Limited.
2. R.J.Ranjit Daniels and Jagadish Krishnaswamy, (2009), **"Environmental Studies",** Wiley India Private Ltd., New Delhi.
3. R Rajagopalan, **"Environmental Studies – From Crisis to Cure**", Oxford University Press, 2005,
4. Aloka Debi, **"Environmental Science and Engineering",** Universities Press (India) Pvt. Ltd. 2012.

Reference Books:

1. Raman Sivakumar, **"Principals of Environmental Science and Engineering",** Second Edition, Cengage learning Singapore, 2005
2. P. Meenakshi, **"Elements of Environmental Science and Engineering",** Prentice Hall of India Private Limited, New Delhi, 2006
3. S.M. Prakash, **"Environmental Studies",** Elite Publishers Mangalore, 2007
4. Erach Bharucha, **"Text Book of Environmental Studies"**, for UGC, University press, 2005
5. G.Tyler Miller Jr., **"Environmental Science – working with the Earth"**, Tenth Edition, Thomson Brooks /Cole, 2004
6. G.Tyler Miller Jr., **"Environmental Science – working with the Earth"**, Eleventh Edition, Thomson Brooks /Cole, 2006
7. Dr.Pratiba Sing, Dr.AnoopSingh and Dr.Piyush Malaviya, **"Text Book of Environmental and Ecology"**, Acme Learning Pvt. Ltd. New Delhi.

BASIC ELECTRONICS

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Subject Code	17ELN15 / 17ELN25	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 04

Course objectives:
The course objective is to make students of all the branches of Engineering to understand the efficacy of Electronic principles which are pervasive in engineering applications

Module -1	**Teaching Hours**
Semiconductor Diodes and Applications (Text-1)**:** p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line analysis, Half-wave rectifier, Two-diode Full-wave rectifier, Bridge rectifier, Capacitor filter circuit (only qualitative approch), Zener diode voltage regulators: Regulator circuit with no load, Loaded Regulator. Numerical examples as applicable. **Bipolar Junction Transistors:** BJT operation, BJT Voltages and Currents, BJT amplification, Common Base, Common Emitter and Common Collector Characteristics, Numerical examples as applicable.	**06 Hours** **04 Hours**
Module -2	
BJT Biasing (Text-1): DC Load line and Bias Point, Base Bias, Voltage divider Bias, Numerical examples as applicable. **Introduction to Operational Amplifiers** (Text-2)**:** Ideal OPAMP, Inverting and Non Inverting OPAMP circuits, OPAMP applications: voltage follower, addition, subtraction, integration, differentiation; Numerical examples as applicable.	**04 Hours** **06 Hours**

Module – 3	
Digital Electronics (Text-2): Introduction, Switching and Logic Levels, Digital Waveform (Sections 9.1to 9.3). Number Systems: Decimal Number System, Binary Number System, Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary, Converting Hexadecimal to Decimal, Converting Decimal to Hexadecimal, Octal Numbers: Binary to Octal Conversion. Complement of Binary Numbers. Boolean Algebra Theorems, De Morgan's theorem. Digital Circuits: Logic gates, NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, X-NOR Gate. Algebraic Simplification, NAND and NOR Implementation (Sections 11.7 and 11.8): NAND Implementation, NOR Implementation. Half adder, Full adder.	**10 Hours**
Module-4	
Flip-Flops (Text-2)**:** Introduction to Flip-Flops (Section 12.1), NAND Gate Latch/ NOR Gate Latch, RS Flip-Flop, Gated Flip-Flops: Clocked RS Flip-Flop (Sections 12.3 to 12.5). **Microcontrollers** (Ref.1)**:** Introduction to Microcontrollers, 8051 Microcontroller Architecture and an example of Microcontroller based stepper motor control system (only Block Diagram approach).	**05 Hours** **05 Hours**
Module-5	
Communication Systems (Text-2): Introduction, Elements of Communication Systems, Modulation: Amplitude Modulation, Spectrum Power, AM Detection (Demodulation), Frequency and Phase Modulation. Amplitude and Frequency Modulation: A comparison. **Transducers (**Text-2)**:** Introduction, Passive Electrical Transducers, Resistive Transducers, Resistance Thermometers, Thermistor. Linear Variable Differential Transformer (LVDT). Active Electrical Transducers, Piezoelectric Transducer, Photoelectric Transducer.	**06 Hours** **04 Hours**

Course outcomes:

After studying this course, students will be able to:

- Appreciate the significance of electronics in different applications,
- Understand the applications of diode in rectifiers, filter circuits and wave shaping,
- Apply the concept of diode in rectifiers, filters circuits
- Design simple circuits like amplifiers (inverting and non inverting), comparators, adders, integrator and differentiator using OPAMPS,
- Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates, and
- Understand the functioning of a communication system, and different modulation technologies, and
- Understand the basic principles of different types of Transuducers.

Question paper pattern:

- The question paper will have ten questions.
- Each full Question consisting of 16 marks
- There will be **2** full questions(with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer **5** full questions, selecting one full question from each module.

Text Books:

1. David A. Bell, **"Electronic Devices and Circuits"**, Oxford University Press, 5th Edition, 2008.
2. D.P. Kothari, I. J. Nagrath, **"Basic Electronics"**, McGraw Hill Education (India) Private Limited, 2014.

Reference Books: MuhammadAli Mazidi, **"The 8051 Microcontroller and Embedded. Systems. Using Assembly and C."** Second Edition, 2011, Pearson India.

COMPUTER PROGRAMMING LABORATORY
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2017 -2018)
SEMESTER - I/II

Laboratory Code	**17CPL 16 / 17CPL26**	IA Marks	20
Number of Lecture Hours/Week	01Hr Tutorial (Instructions) + 02 Hours Laboratory	Exam Marks	80
Total Number of Lecture Hours	48	Exam Hours	03

CREDITS - 02

Course objectives: To provide basic principles C programming language. To provide design & develop of C programming skills. To provide practical exposures like designing flowcharts, algorithms, how to debug programs etc**.**

Descriptions (if any):

Demonstration of Personal Computer and its Accessories: Demonstration and Explanation on Disassembly and Assembly of a Personal Computer by the faculty-in-charge. Students have to prepare a write-up on the same and include it in the Lab record and evaluated.

Laboratory Session-1: Write-up on Functional block diagram of Computer, CPU, Buses, Mother Board, Chip sets, Operating System & types of OS, Basics of Networking & Topology and NIC.

Laboratory Session-2: Write-up on RAM, SDRAM, FLASH memory, Hard disks, Optical media, CD-ROM/R/RW, DVDs, Flash drives, Keyboard, Mouse, Printers and Plotters. Introduction to flowchart, algorithm and pseudo code.

***Note: These* TWO Laboratory sessions** are used to fill the gap between theory classes and practical sessions. Both sessions are to be evaluated as lab experiments.

Laboratory Experiments:

Implement the following programs with WINDOWS / LINUX platform using appropriate C compiler.

1. Design and develop a flowchart or an algorithm that takes three coefficients (***a***, ***b***, and ***c***) of a Quadratic equation ($ax^2+bx+c=0$) as input and compute all possible roots. Implement a C program for the developed flowchart/algorithm and execute the same to output the possible roots for a given set of coefficients with appropriate messages.

2. Design and develop an algorithm to find the ***reverse*** of an integer number **NUM** and check whether it is PALINDROME or NOT. Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: Num: **2014**, Reverse: **4102**, Not a Palindrome

3. 3a. Design and develop a flowchart to find the square root of a given number ***N***. Implement a C program for the same and execute for all possible inputs with appropriate messages. Note: **Don't use library function *sqrt(n)*.**

3b. Design and develop a C program to read a ***year*** as an input and find whether it is ***leap year*** or not. Also consider end of the centuries.

4. Design and develop an algorithm to evaluate polynomial $\mathbf{f(x) = a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0}$, for a given value of ***x*** and its coefficients using Horner's method. Implement a C program for the same and execute the program with different set of values of coefficients and ***x.***

5. Draw the flowchart and Write a C Program to compute **Sin(x)** using Taylor series approximation given by **$Sin(x) = x - (x^3/3!) + (x^5/5!) - (x^7/7!) + \ldots\ldots$**
   Compare your result with the built- in Library function. Print both the results with appropriate messages.

6. Develop an algorithm, implement and execute a C program that reads ***N*** integer numbers and arrange them in ascending order using ***Bubble Sort***.

7. Develop, implement and execute a C program that reads two matrices ***A*** (**m x n**) and ***B*** (**p x q**) and Compute product of matrices ***A*** and ***B***. Read matrix ***A*** and matrix ***B*** in row major order and in column major order respectively. Print both the input matrices and resultant matrix with suitable headings and output should be in matrix format only. Program must check the compatibility of orders of the matrices for multiplication. Report appropriate message in case of incompatibility.

8. Develop, implement and execute a C program to search a Name in a list of names using ***Binary searching*** Technique.

9. Write and execute a C program that
   i. Implements string copy operation ***STRCOPY***(str1,str2) that copies a string *str1* to another string *str2* without using library function.
   ii. Read a *sentence* and print frequency of vowels and total count of consonants.

10.
   a. Design and develop a C function ***RightShift****(x ,n)* that takes two integers *x* and *n* as input and returns value of the integer *x* rotated to the right by *n* positions. Assume the integers are unsigned. Write a C program that invokes this function with different values for *x* and *n* and tabulate the results with suitable headings.

   b. Design and develop a C function ***isprime***(num) that accepts an integer argument and returns 1 if the argument is prime, a 0 otherwise. Write a C program that invokes this function to generate prime numbers between the given range.

11. Draw the flowchart and write a ***recursive*** **C** function to find the factorial of a number, ***n!***, defined by *fact*(*n*)=1, if *n*=0. Otherwise *fact*(*n*)=*n***fact*(*n*-1). Using this function, write a C program to compute the binomial coefficient ${}_nC_r$. Tabulate the results for different values of ***n*** and ***r*** with suitable messages.

12. Given two university information files "**studentname.txt**" and "**usn.txt**" that contains students Name and USN respectively. Write a C program to create a new file called "**output.txt**" and copy the content of files "studentname.txt" and "usn.txt" into output file in the sequence

shown below . Display the contents of output file "output.txt" on to the screen.

Student Name	USN
Name 1	USN1
Name 2	USN2
….	….
….	….

Heading

13. Write a C program to maintain a record of **n** student details using an array of structures with four fields (Roll number, Name, Marks, and Grade). Assume appropriate data type for each field. Print the marks of the student, given the student name as input.

14. Write a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of **n** real numbers.

Course outcomes:

- **Gaining Knowledge on various parts of a computer.**
- **Able to draw flowcharts and write algorithms**
- **Able design and development of C problem solving skills.**
- **Able design and develop modular programming skills.**
- **Able to trace and debug a program**

Conduction of Practical Examination:

1 . All laboratory experiments (nos) are to be included for practical examination.
2 . Students are allowed to pick one experiment from the lot.
3 . Strictly follow the instructions as printed on the cover page of answer script for breakup of marks
4 . Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

ENGINEERING CHEMISTRY LABORATORY

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I/II

Laboratory Code	17CHEL17/17CHEL27	IA Marks	20
Number of Lecture Hours/Week	3 (1 hr Tutorial +2 hrs lab)	Exam Marks	80
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS - 02

Course objectives:

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

Instrumental Experiments

1. Estimation of FAS potentiometrically using standard $K_2Cr_2O_7$ solution.
2. Estimation of Copper colorimetrically.
3. Estimation of Acids in acid mixture conductometrically.
4. Determination of pKa of weak acid using pH meter.
5. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
6. Estimation of Sodium and Potassium in the given sample of water using Flame Photometer.

Volumetric Experiments

1. Estimation of Total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.
4. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by External Indicator method.
5. Estimation of Alkalinity (OH^-, CO_3^{--} & HCO_3^-) of water using standard HCl solution.
6. Determination of COD of waste water.

Course outcomes:

On completion of this course, students will have the knowledge in,

- Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results, and
- Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results

Conduction of Practical Examination:

1. All experiments are to be included for practical examination.
2. One instrumental and another volumetric experiments shall be set.
3. Different experiments shall be set under instrumental and a common experiment under volumetric.

Reference Books:

1. G.H.Jeffery, J.Bassett, J.Mendham and R.C.Denney, **"Vogel's Text Book of Quantitative Chemical Analysis"**
2. O.P.Vermani & Narula, **"Theory and Practice in Applied Chemistry"**, New Age International Publisers.
3. Gary D. Christian, **"Analytical chemistry**", 6th Edition, Wiley India.