FACULTY OF ENGINEERING

Scheme of Instruction & Examination

(AICTE Model Curriculum for the Academic Years 2020-2024)

and

Syllabi

B.E. I and II Semester of

Four Year Degree Programme

in

Civil Engineering

(With effect from the academic year 2020– 2021)
(As approved in the faculty meeting held on 04.01.2021)

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad – 500 007

30.01.2021

SEMESTER-WISE SYLLABI OF COURSES

SCHEME OF INSTRUCTION & EXAMINATION
B.E. (Civil Engineering) I- SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction			Scheme of Examination		Credits
			L	T	Pr/ Drg	CIE	SEE	
Theory Courses								
1	BS 201 MT	Mathematics -I	3	1	-	30	70	4
2	BS 214 CH	Chemistry	3	1	-	30	70	4
3	ES 302 CS	Programming and Problem Solving	3	-	-	30	70	3
4	MC802CE	Environmental Sciences	2	-	-	30	70	-
Practical/ Laboratory Courses								
5	BS253 CH	Chemistry Laboratory	-	-	3	25	50	1.5
6	ES351 CS	Programming and Problem Solving Laboratory	-	-	2	25	50	1
7	ES 352 ME	Workshop Practice	-	-	2 x 3hrs	50	50	3
			9	**1**	**12**			**16.5**

***Mandatory Requirement: Three weeks induction program to be conducted before commencement of the coursework of Semester-I as per the guidelines given by AICTE**

MATHEMATICS-I

BS 201 MT

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 4

Objectives:

1.To introduce the concepts of sequences, series and their properties
2.To introduce the concepts of functions of several variables and multiple integrals
3. To study vector differential and integral calculus

Outcomes:

The students will able to
1. Find the nature of sequences and series
2. Evaluate multiple integrals
3. Apply this knowledge to solve the curriculum problems

UNIT – I

Sequences and Series: Sequences, Series, General properties of series, Series of positive terms, Comparison tests, tests of Convergence D'Alembert's ratio test, Cauchy's n^{th} root test, Raabe's test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence and Conditional convergence.

UNIT – II

Calculus of one Variable: Rolle's theorem, Lagrange's, Cauchy's mean value theorems, Taylor's series, Curvature, Radius of curvature, Circle of curvature, Envelope of a family of curves, Evolutes and Involutes.

UNIT – III

Multivariable Calculus (Differentiation)*:* Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobian, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum values of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT – IV

Multivariable Calculus (Integration)*:* Double integrals, Change of order of integration, Change of Variables from Cartesian to plane polar coordinates, Triple integrals.

UNIT – V

Vector Calculus: Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem (without proofs) and their verification.

Suggested Reading:

1. R.K. Jain & S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 2014.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9^{th} Edition, 2012.
3. B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43^{rd} Edition, 2014.
4. G.B. Thomas, Maurice Weir and Joel Hass, *Thomas' Calculus*, Peterson, 12^{th}

Edition,2010.
5. B.V. Ramana, Higher Engineering Mathematics, 23rd reprint, 2015.

CHEMISTRY

BS 214 CH

Instruction: 3 periods per week+1period tutorial *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 4

Objectives:

1. Correlate the properties of materials with their internal structure and use the for Engineering applications
2. Apply the principals of electrochemistry in storage of electrical energy in batteries.
3. Gains knowledge in causes of corrosion and its prevention.
4. Attains knowledge about the disadvantages of hard water for domestic and industrial purposes. Also learns the techniques of softening of hard water and treatment of water for drinking purpose.
5. Exposed to qualitative and quantitative parameters of chemical fuels.

Outcomes:

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

1. Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
2. Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
3. Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
4. Explain the influence of chemical structure on properties of materials and their choice in engineering applications
5. Classify chemical fuels and grade them through qualitative analysis.

UNIT – I:

Water and its treatment

Hardness of Water: Types of hardness-temporary and permanent, units and interrelation between them, Boiler troubles–Scale & sludge, Priming and foaming, Caustic embrittlement - Treatment of boiler feed water–Internal treatment (Colloidal and Calgon conditioning)– External treatment – Zeolite process, ion exchange process. Potable water - Steps involved in treatment of potable water–Disinfecting water by chlorination and ozonization – Reverse Osmosis &its significance.

UNIT – II

Corrosion and its control

Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: galvanic, water-line and pitting corrosion.
Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

UNIT – III

Inorganic Engineering Materials

Refractories: Refractories, Properties of Refractories, Manufacture of Refractories, Common Refractory Bricks.

Polymers: Classification of polymers, Types of Polymerization–addition and condensation, differences between addition and condensation polymers, Mechanism of free radical addition polymerization.

Plastics: Thermoplastic &Thermosetting resins, differences between thermoplastic and thermosetting polymers. Preparation, properties and engineering applications of PVC, Teflon and Bakelite.

Glasses and Ceramics: Glasses, Manufacture of Glasses, Types of Glasses, Glass– Reinforced glass material, Advanced Ceramics.

UNIT – IV

Adhesives

Introduction- adhesive action, Development adhesive strength. Physical factors influencing adhesive action. Chemical factors influencing adhesive action. Bonding process by adhesive. Classification of adhesive.

UNIT – V

Explosives and Propellents

Explosives – Classifications of explosives – Primary explosives- Low explosives and high explosives. Precautions during storage of explosives. Blasting fuses. Manufacture of important explosives. Classification of propellents- Rocket propellents.

Suggested Reading:

1. Engineering Chemistry by P C Jain and M Jain Dhanpat Rai & Sons (15^{th} Edn), New Delhi.
2. Chemistry in Engineering and Technology by J C Kuriacose and J Rajaram, TMH, New Delhi
3. Engineering Chemistry by O G Palanna, TMH, and New Delhi.
4. Engineering Chemistry by S S Dara, S Chand & Sons, New Delhi.
5. Engineering Chemistry by Sashi Chawla. Dhanpat Rai & Sons, New Delhi.
6. Engineering Chemistry by Shikha Agrawal, Cambridge, New Delhi.
7. Engineering Chemistry by Prasanta Rath, Cengage Learning India Pvt. Ltd.

PROGRAMMING AND PROBLEM SOLVING

ES 302 CS

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

1. To introduce the basic concepts of Computing environment, number systems and flowcharts
2. To familiarize the basic constructs of C language – data types, operators and expressions
3. To understand modular and structured programming constructs in C
4. To learn the usage of structured data types and memory management using pointers
5. To learn the concepts of data handling using pointers

Outcomes:

The students will able to

1. Formulate simple algorithms for arithmetic and logical problems.
2. Translate the algorithms to programs (in c language).
3. Test and execute the programs and correct syntax and logical errors.
4. Implement conditional branching, iteration and recursion.
5. Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. Use arrays, pointers and structures to formulate algorithms and programs.
7. Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

UNIT – I

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.).
Idea of Algorithm: steps to solve logical and numerical problems.
***Representation of Algorithm*:** Flowchart / Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

UNIT – II

***Control Structures*:** Arithmetic expressions and precedence, Conditional Branching and Loops**,** Writing and evaluation of conditionals and consequent branching.
***Arrays*:** Arrays (1-D, 2-D), Character arrays and Strings

UNIT – III

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble and Selection), Finding roots of Equations. ***Functions:*** Functions (including using built in libraries), Parameter passing in functions, call by value. ***Passing arrays to functions*:** idea of call by reference

UNIT – IV

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series. ***Structure:*** Structures, Defining structures and Array of Structures

UNIT – V

Pointers **-** Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation), **Introduction to File Handling.**

Suggested Reading:

1. Byron Gottfried, Schism's Outline of Programming with C, McGraw-Hill
2. A.K. Sharma, Computer Fundamentals and Programming in C, Universities Press, 2nd Edition, 2018.
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
4. Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India.

ENVIRONMENTAL SCIENCE

MC 802 CE

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits :Non-Credit

Course Objectives

1. To create awareness and impart basic knowledge about the environment and its allied problems.
2. To know the functions of ecosystems.
3. To understand importance of biological diversity.
4. To study different pollutions and their impact on environment.
5. To know social and environment related issues and their preventive measures.

Course Outcomes

After completing this course, the student will be able to:

1. Adopt environmental ethics to attain sustainable development.
2. Develop an attitude of concern for the environment.
3. Conservation of natural resources and biological diversity.
4. Creating awareness of Green technologies for nation's security.
5. Imparts awareness for environmental laws and regulations.

UNIT-I

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

Natural Resources: Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources –Use and over exploitation, deforestation & its effect on tribal people. Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification**.** Energy Resources –Growing energy needs, Renewable and Non-renewable energy resources.

UNIT-II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland, desert)

UNIT-III

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

UNIT-IV

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management.

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation.

UNIT-V

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

Suggested Readings:

1. A.K. De, *Environmental Chemistry,* Wiley Eastern Ltd.
2. E.P. Odum, *Fundamentals of Ecology*, W.B. Sunders Co., USA.
3. M.N. Rao and A.K. Datta, *Waste Water Treatment,* Oxford and IBK Publications.
4. Benny Joseph, *Environmental Studies,* Tata McGraw Hill, 2005.
5. V.K. Sharma, *Disaster Management,* National Centre for Disaster Management, IIPE,1999.

CHEMISTRY LABORATORY

BS 253 CH

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 25marks *SEE: 50 marks*
Credits : 1.5

Objectives:

1. Conduct experiments, take measurements and analyse the data though hands-on experience in order to demonstrate understanding of the theoretical concepts of quantitative Analysis while working in small group.
2. Interpret the electro analytical principles with experimental results graphically
3. Demonstrate writing skills through clear laboratory reports

Outcomes:

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

1. Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
2. Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
3. Synthesize small drug molecules.

List of Experiments:

1. Introduction to Chemical Analysis.
2. Techniques of Weighing.

Volumetric Analysis:

3. Preparation of Standard Mohr's salt solution, Standardization of $KMnO_4$ and estimation ferrous ion
4. Estimation Iron(II) by Dichromatometry

Water Analysis:

5. Preparation of Standard Magnesium sulphate solution, standardization of EDTA and Estimation of Total Hardness.
6. Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate Alkalinity.

Conductometry:

7. Estimation of HCl

8. Estimation of CH_3COOH and mixture of acids

Potentiometry

9. Estimation of HCl

10. Estimation of Iron

pH Metry:

11. Estimation of HCl

Colorimetry:

12. Verification of Beer-Lambert's law and estimation of Manganese.

Chemical Kinetics:

13. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.

Drug Synthesis

14. Preparation of Aspirin

Note: Minimum ten experiments should be conducted in the semester

Suggested Reading:

1. Senior Practical Physical Chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co. Delhi)
2. An Introduction to Practical Chemistry, K. K. Sharma and D.S. Sharma (Vikas publishing N. Delhi)

PROGRAMMING AND PROBLEM SOLVING LABORATORY

ES 351 CS

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits : 1

Objectives:

1. Understand the fundamentals of programming in C Language.
2. Write, compile and debug programs in C.
3. Formulate solution to problems and implement in C.
4. Effectively choose programming components to solve computing problems.

Outcomes:

The students will able to

1. Choose appropriate data type for implementing programs in C language.
2. Design and implement modular programs involving input output operations, decision making and looping constructs.
3. Implement search and sort operations on arrays.
4. Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
5. Design and implement programs to store data in structures and files.

LIST OF EXPERIMENTS

1. Finding maximum and minimum of given set of numbers, finding roots of quadratic equation.
2. Sin x and Cos x values using series expansion.
3. Conversion of binary to decimal, octal, hexadecimal and vice versa.
4. Generating Pascal triangle, pyramid of numbers.
5. Recursion: factorial, Fibonacci, GCD.
6. Matrix addition and multiplication using arrays, linear search and binary search using recursive and non-recursive procedures.
7. Bubble sort and selection sort.
8. Programs on pointers: pointer to arrays, pointer to functions.
9. Functions for string manipulations.
10. Programs on structures and unions.
11. Finding the number of characters, words and lines of given text file.
12. File handling programs

Suggested Reading:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. A.K. Sharma, Computer Fundamentals and Programming in C, Universities Press, 2018.
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
4. Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India.

WORKSHOP PRACTICE

ES 352 ME

Instruction: 6 periods per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 50 marks*
Credits : 3

Objectives:

1. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
2. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
3. To gain a good basic working knowledge required for the production of various engineering products.
4. To Study different hand operated power tools, uses and their demonstration.
5. Adopt safety practices while working with various tools

Outcomes:

1. Demonstrate an understanding of and comply with workshop safety regulations.
2. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.
3. Study and practice on machine tools and their operations
4. Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
5. Apply basic electrical engineering knowledge for house wiring practice

LIST OF EXPERIMENTS:

A. TRADE FOR EXERCISES:

1. Carpentry
2. Fitting
3. House wiring
4. Sheet metal working
5. Smithy
6. Welding
7. Plumbing

B. TRADES FOR DEMONSTRATION AND EXPOSURE:

1. Machining (Lathe & Drilling)
2. Injection moulding
3. Mould making and casting
4. Basic Electronics lab instruments

C. PRESENTATIONS AND VIDEO LECTURES

1. Manufacturing Methods
2. Rapid Prototyping
3. Glass Cutting
4. 3D printing
5. CNC LATHE

D. **IT WORKSHOP**: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, operating system installation.

Note: At least two exercises from each trade.

Suggested Reading:

1. Venugopal, K, "Workshop manual", Anuradha Publications, Kumbakonam, TN, 2012
2. K.C. John, "Mechanical Workshop" 2nd Edn., PHI, 2010.
3. Hajra Choudary, "Elements of Workshop Technology" Vol. 1, Asian Publishers, Edn., 1993.
4. G.S. Sawhney, "Mechanical Experiments and Workshop Practice", I.K. International Publishing House, New Delhi, 2009.