**Bachelor of Technology**

**Batch: 2020 - 2023**

*I & II*

*Semester*

*Course Matrix & Syllabus*

**1a. Program Structure**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sem** | **BS** | **ES** | **HSS** | **Core** | **DE** | **OE** | **MC** | **SEC** | **Total**  **Credits** |
| I | 09 | 07 | 03 | -- | -- | -- | 00 | -- | 19/20 |
| II | 09 | 08 | 03 | -- | -- | -- | 00 | -- | 20/19 |

**1b. List of Courses**

**BS:** Basic Science

1. **Mathematics –1**
2. **Mathematics – 2**
3. **Physics**
4. **Chemistry**

**ES:** Engineering Science

1. **Engineering Graphics**
2. **Workshop Practice**
3. **Problem Solving Through Programming**
4. **Basics of Electrical Engineering**

**HSS:** Humanity & Social Science

1. **Sociology and Elements of Indian History for Engineers**
2. **Communicative English**

**MC:** Mandatory Course – NON CREDIT

1. **Induction Programme**
2. **constitution of India**

**Course matrix**

**Academic year: 2020 - 23**

**(Common to all branches – Physics Cycle)**

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| **Sl.**  **No.** | **Name of the Subject** | **Credit** | **L–T–P** | **Continues Assessment** | | **Internal Assessment** | | **End Practical**  **Examinations** | | **End Semester**  **Examinations** | | **Minimum**  **Passing Marks** |
| **Max**  **Marks** | **Min.**  **Marks** | **Max.**  **Marks** | **Min.**  **Marks** | **Max.**  **Marks** | **Min.**  **Marks** | **Max.**  **Marks** | **Min.**  **Marks** |
| 1 | Mathematics –1 | 4 | 3-1-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 2 | Physics | 4 | 3-1-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 3 | Communicative English | 2 | 2-0-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 4 | Problem Solving Through Programming | 3 | 2-1-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 5 | Engineering Graphics | 3 | 1-0-2 |  |  | 30 |  | 70 | 28 |  |  | 40 |
| 6 | Physics Lab | 1 | 0-0-2 | 100 |  |  |  |  |  |  |  | 40 |
| 7 | Problem Solving Through Programming Lab | 1 | 0-0-2 | 100 |  |  |  |  |  |  |  | 40 |
| 8 | Communicative English Lab | 1 | 0-0-2 | 100 |  |  |  |  |  |  |  | 40 |

**Mandatory Course**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **9** | **Induction Programme (non-credit)** | **-** |  | | | | | | | | | |
|  | **Total** | **19** |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BS** | **ES** | **HSS** | **Core** | **DE** | **OE** | **MC** | **SEC** | **Total Credits** |
| 09 | 07 | 03 | -- | -- | -- | 00 | -- | **19** |

**Mathematics - 1**

**Subject Code : 18BS1MA01 Semester : 1**

**Hours/week : 3:1:0 Total Hours : 45 + 15**

**Credits : 4 L-T-P : 3-1-0**

**IA : 30 SEE : 70**

**Module 1: Calculus (8 lectures+3Tutorials)**

Rolle’s Theorem, Lagrange’s and Cauchy’s Mean value theorems, Taylor’s & MacLaurin’s series for a function of one variable, Evaluation of indeterminate forms by L'Hospital's rule.

**Module 2: Matrices (10 lectures+3Tutorials)**

Rank of a matrix, Echelon form, System of linear equations: Consistency, solution by Gauss elimination and Gauss-Siedel methods, Eigen values and Eigen vectors of square matrices, Diagonalization of square matrices. Conversion of an nth order differential equation to a system of first order linear differential equations, Solution of system of linear differential equations by diagonalization method and discuss the stability of the system.

**Module 3: Calculus: (8 lectures+3Tutorials)**

Reduction formulae (without proof), Evaluation of definite and improper integrals, Beta and Gamma functions and their properties (without proof) and problems

Tracing of standard curves: Strophoid, Leminscate, Cardioid, and Astroid. Applications of definite integrals to evaluate surface areas and volumes of revolutions.

**Module 4: Multivariable Calculus: (9 lectures+3Tutorials)**

Partial derivatives, Total derivative, Jacobians,

Maxima & Minima for function of two variables, Method of Lagrange multipliers, Gradient, Curl, Divergence & Directional derivatives, Vector identities (Statement).

**Module 5: Ordinary differential equations: (10 lectures+3Tutorials)**

Exact, Reducible to exact, Linear and Bernoulli’s differential equations, higher order linear differential equations with constant coefficients

Method of variation of parameters, higher order linear differential equations with variable coefficients: Cauchy and Legendre’s differential equation.

**Assignment : Eigen values, Eigen vectors, solution of the system of differential equations using MATLAB.**

**Note : No questions will be asked from assignment section in the examination.**

**text BooKS**

1. B.S. Grewal; Higher Engineering Mathematics, Khanna Publishers, 41st Edition, 2011.
2. B V Ramana; Higher Engineering Mathematics, 10th Reprint Edition, 2010.

**References**

1. Erwin Kreyszig; Advanced Engineering Mathematics, 9th  Edition, 2012.
2. Dennis G Zill & Michael R Cullen; Advanced Engineering Mathematics, Second Edition; Jones & Barlett Publishers; 2000.

**Course Learning Objectives (CLO)**

The objective of this course is to make students

* Familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra
* To equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Outcomes**

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

**CO1 :** Understand Mean value theorems and determine the power series expansion of the function

**CO2 :** Determine the Eigen values and Eigen vector to solve system of first order differential

equations

**CO3 :** Evaluation of surface area and volumes of revolution by definite integrals

**CO4 :** Estimate the extreme values of the multivariable function and determine potential functions

for irrotational force fields

**CO5 :** Solve first and higher order ordinary differential equations.

**Mathematics - 2**

**Subject Code : 18BS2MA01 Semester : 2**

**Hours/week : 4 Total Hours : 45 + 15**

**Credits : 4 L-T-P : 3:1:0**

**IA : 30 SEE : 70**

**Prerequisite:**

Set theory, Data classification, mean, median, mode, histogram, frequency polygon, series expansions.

**Module 1: Multivariable Calculus (Integration): (10 lectures+3Tutorials)**

Multiple Integration: Double integrals, change of order of integration, Change of variables, Triple integrals, Applications: areas and volumes, orthogonal curvilinear coordinates

**Module 2: Vector Integration: (8 lectures+3Tutorials)**

Line integrals, surface integrals, volume integrals, Problems on Green, Gauss and Stokes theorem (without proof)

**Module 3: Laplace transforms and Inverse Laplace transform: (10 lectures+3Tutorials)**

Definition, Laplace transforms of elementary functions, properties of Laplace transforms (without proof).

Laplace transforms of periodic functions (without proof), Heaviside function and Dirac’s Delta function.

Inverse Laplace transforms: Definition, transforms of standard functions and properties. Convolution theorem (without proof) and evaluation of inverse Laplace transforms using Convolution theorem. Solution of ordinary differential equations using Laplace transforms.

**Module 4: Complex Variable – Differentiation: (8 lectures+3Tutorials)**

Complex Differentiation, Cauchy-Riemann equations in Cartesian and Polar form, analytic functions, harmonic functions, construction of analytic functions and their properties.

Conformal mappings , Bilinear/Mobius transformations and their properties.

**Module 5: Complex Variable – Integration: (9 lectures+3Tutorials)**

Contour integrals, Cauchy theorem (without proof), Cauchy Integral formula (without proof), Taylor’s series, Laurent’s series. Zeros of analytic functions, singularities, Residues, Cauchy Residue theorem (without proof),

**Assignment : Solution of the system of linear and non-linear differential equations and graphical analysis using MATLAB**

**Note : No questions will be asked from self-study and assignment section in the exam**

**TEXT BOOKS**

1. B.S. Grewal; Higher Engineering Mathematics, Khanna Publishers, 41st Edition, 2011.
2. B V Ramana; Higher Engineering Mathematics, 10th Reprint Edition, 2010.

**References**

1. Dennis G Zill & Michael R Cullen; Advanced Engineering Mathematics, Second Edition; Jones & Barlett Publishers; 2000.
2. Erwin Kreyszig; Advanced Engineering Mathematics, 9th  Edition, 2012.

**Course Outcomes:**

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

**CO1 :** Apply multiple integrals to find area, surface area and volume

**CO2 :** Evaluate line, surface and volume integrals of vector fields

**CO3 :** Apply Laplace Transforms to solve ordinary differential equations

**CO4 :** Understand thedifferentiation and integration of complex valued functions.

**Course Learning Objectives (CLO)**

The objective of this course is to make students

* Familiarize the prospective engineers with techniques in calculus, multivariate integration, Laplace transforms and differentiation and integration of complex variable
* To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

**PHYSICS**

**Code: 18BSPH02 Total Hours: 60**

**Credits: 4 Hours/week: 5**

***Module 1***: **Electrostatics and Magnetostatics (9 hrs)**

**Electrostatics:** Electrostatic field and potential of a dipole, dielectric constant, Bound charges due to electric polarization, electric displacement, dielectric slab in uniform electric field, relation between dielectric susceptibility (χ,), dielectric constant and P, Electric polarization mechanisms -electronic, ionic, orientational, space charge polarization, Expression for internal field in one- dimensional solid dielectrics, numericals.

**Magnetostatics:** Biot savart’s law, divergence and curl of static magnetic field, Gauss divergence theorem sand stokes’ theorem, Faraday’s law in terms of EMF produced by changing magnetic flux, Magnetic field due to simple magnets like a bar magnet. Diamagnetic, paramagnetic and ferromagnetic materials (qualitative approach), concept of domains B-H curve in ferromagnetic materials, soft and hard magnetic materials, applications.

***Module 2***: **Modern physics** **(9hrs)**

**Dual nature of matter**: Wave particle dualism. de-Broglie hypothesis, Davisson and Germer experiment, Matter waves and their characteristic properties.. Phase velocity and group velocity, Relation between phase velocity and group velocity. Relation between group velocity and particle velocity. Problems on de-Broglie’s wavelength.

**Wave mechanics**; Heisenberg‟s uncertainty principle, significance and its applications: non existence of electron inside the nucleus. Wave function; properties of wave function and physical significance. Probability density and Normalization of wave function, Schrodinger time independent wave equation in one dimension, Eigen values and Eigen functions. Applications of Schrödinger wave equation – Particle in one dimensional infinite potential well. Numericals

***Module 3*:** **Introduction to solids** **(9hrs)**

Review of classical free electron theory, Quantum free electron theory, Fermi energy and Fermi factor in metals, Variation of Fermi factor with energy and temperature, Fermi-Dirac statistics, Derivation of density of states, Band theory of solids ( qualitative approach) Intrinsic semiconductors, concept of effective mass ( qualitative) Intrinsic carrier density, Fermi level in intrinsic semiconductors, Extrinsic semiconductors- types, variation of carrier concentration with temperature, variation of Fermi level with temperature, numericals.

***Module 4* Crystal physics (9 hrs)**

Space lattice, Basis vectors, Unit cell, lattice parameters. Bravais lattice and crystal systems, Estimation of directions and planes in a crystal lattice, Miller indices and expression for interplanar spacing in terms of Miller indices. Expression for lattice constant for a cubic lattice, Co-ordination number, Atomic packing factor-Atomic packing factor for sc, bcc and fcc structures. Crystal structures of NaCl and diamond, Diffraction of x-rays –derivation of Bragg’s law,Determination of crystal structure by Bragg’s X-ray Spectrometer, –problems on Bragg’s Law.

***Module 5*:** **Lasers and optical fibers**: (**9hrs)**

**Lasers**- Interaction between radiation and matter (induced absorption, spontaneous and stimulated emission). Expression for energy density at thermal equilibrium in terms of Einstein‟s coefficients. Characteristics of laser light, Conditions for laser action- population inversion and Meta stable state, Requisites of laser system, Construction and working of Carbon Dioxide (CO2) laser & Nd-YAg laser. Applications of lasers, Numericals.

**Optical fibers**- Construction and light propagation mechanism in optical fibers (total internal reflection and its importance), Acceptance angle, Numerical Aperture (NA), Expression for numerical aperture in terms of refractive indices of core and cladding, Condition for wave propagation in optical fiber, V-number and Modes of propagation, Types of optical fibers, Attenuation; absorption, scattering and radiation loss, Point to point communication systems, numerical.

**Reference books:**

1. Fundamentals of Physics - Halliday and Resnick, 10th Edition, 2012, Wiley, UK
2. Introduction to Mechanics - MK Verma, 2008, CRC Press, Taylor and Francis.
3. Quantum Mechanics - D.J Griffiths, 2013, Pearson Pentice Hall, New Jercy.
4. Lasers and Nonlinear Optics - B.B Laud, 2011, New Age International, New Delhi.
5. Solid State Electronics Devices - B.G. Streetman, 7th Edition, 2014, Pearson Pentice Hall, New Jercy.
6. Concept of Modern Physics - Arthur Beiser, 2009, MacGraw Hill, New Delhi.

**Course Outcomes:**

On completion of this course, students are able to

1. *Recall and relate the knowledge of quantum physics to the properties of advanced*

*materials such as conductors, semiconductors, dielectrics, lasers and optical fibers etc.*

1. *Interpret the physical laws to study the materials properties.*
2. *Apply the problem solving ability to identify and construct the applications of the advanced materials in new technologies.*

**Problem Solving through Programming**

**Code: 18ESCS01 Total Hours: 45**

**Credits: 3 Hours/week: 4**

***Module 1:* Introduction (8hrs)**

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking– Algorithm – Pseudo code – Flow Chart

**Module 2: C PROGRAMMING BASICS (10hrs)**

Problem formulation – Problem Solving - Introduction to ‘ C’ programming –fundamentals –structure of a ‘C’ program – compilation and linking processes – Constants, Variables – Data

Types – Expressions using operators in ‘C’ – Managing Input and Output operations –

Decision Making and Branching – Looping statements – solving simple scientific and

statistical problems.

**Module 3:ARRAYS AND STRINGS 9hrs**

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String-

String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

**Module 4: FUNCTIONS AND POINTERS 9hrs**

Function – definition of function – Declaration of function – Pass by value – Pass by

reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems.

**Module – 5: STRUCTURES AND UNIONS 9hrs**

Introduction – Need for structure data type – structure definition – Structure declaration –Structure within a structure - Union - Programs using structures and Unions – Storage

classes, Pre-processor directives.

**TEXTBOOKS:**

**1** Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition,

Oxford University Press, 2009.

**2** Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.

**3** Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.

**REFERENCES:**

**1** Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson

Education, 2006.

**2** Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Second Edition, Tata McGraw-Hill,

2006.

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

**CO-1** Understand the components of computing systems, Develop algorithms for mathematical and

scientific problems.

**CO-2** Choose data types and structures to solve mathematical and scientific problem

**CO-3** Develop modular programs using control structures

**CO-4** Write programs to solve real world problems using programming features

**Engineering Graphics & Design**

**Code: 18ESME03 Total Hours: 30 + 30**

**Credits: 3 Hours/week: 2:0:2**

## 

***Module 1****:* **Introduction to Engineering Drawing**

Principles of Engineering Graphics and their significance, Overview of Computer Graphics Demonstrating knowledge of the theory of CAD software consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits, applying Annotations, layering & other functions in the CAD Tool, Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views.

***Module 2:*** **Orthographic Projections:**

Principles of Orthographic, Projections of Points and Lines inclined to both planes; Projections of planes inclined Planes.

***Module 3:*** **Projections of Regular Solids& section of solids**

Prism, Cylinder, Pyramid, Cone, **(without beta calculation and freely suspended problems),** draw the sectional orthographic views of geometrical solids, Development of surfaces, Solids - Prism, Pyramid, Cylinder and Cone.

***Module 4:*** **Isometric Projection**

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

***Module 5:*** **Demonstration of a simple team design project**

Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, and shower

**Suggested Text/Reference Books:**

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Sci-tech Publishers
5. Corresponding set of CAD Software Theory and User Manuals.

**Course Learning Objectives (CLO)**

* Knowledge on the fundamentals of Engineering drawing and standards in engineeringdrawing
* To learn fundamental knowledge on computer aided Engineering drawing (CAED).
* Ability to develop and/or comprehend a simple engineering drawing in all four quadrants& international practice and engineering graphics.
* Students will be able to draw orthographic projections***.***

**Course Outcomes**

* To prepare you to design a system, component, or process to meet desired needs within realistic constraints.
* Students will learn techniques, skills, and modern engineering tools necessary for engineering practice
* Exposure to engineering graphics standards
* Exposure to computer-aided geometric design

**ENGLISH**

**Code: 18HSS01 Total Hours: 30+15**

**Credits: 3 Hours/week: 2:0:1**

***Module 1*: Vocabulary**

Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations. Phonetic transcriptions.

***Module 2*:**  Basic Writing Skills

Sentence Structure, Use of phrases and clauses in sentences , Importance of proper punctuation, Creating coherence Organizing principles of paragraphs in document, Techniques for writing precisely

***Module 3*:** Identifying Common Errors in Writing

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Article, Prepositions, Redundancies.

***Module 4*:** Listening Comprehension

Pre-listening, Active listening, Note taking*,*  Answering short answer questions

***Module 5*:** Reading comprehension & Oral Communication

Note making, Summarizing, Reading aloud, Pronunciation, Intonation, Stress and Rhythm, Common Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interview, Formal Presentations.

**Reference Books:**(i) Practical English Usage. Michael Swan. OUP. 1995.

(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007

(iii)On Writing Well. William Zinsser. Harper Resource Book. 2001

(iv)Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

(vi)Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

**Course Objectives**

1. The student will acquire basic proficiency in English by improving their LSRW (Listening, Speaking, Reading & Writing) skills.

**Course outcomes**

CO1: Enhance their writing skills with proper understanding of grammar and syntax

CO2: Improve their public speaking skills with correct pronunciation and practicing situational conversations.

CO3: Enable them to comprehend written texts

CO4: Develop their listening comprehension skills by practicing active listening

## Constitution of India

**Code:** 18MCC01 **Total Hours:**

***Module 1*: Introduction to Indian Constitution**

[Meaning of the term Constitution](http://indianconstitution4ba.blogspot.in/2012/10/what-is-constitution.html), [Preamble of the Constitution](http://indianconstitution4ba.blogspot.in/2012/08/preamble.html),[Constituent Assembly](http://indianconstitution4ba.blogspot.in/2012/10/the-constituent-assembly.html)[The Salient Features of Indian Constitution](http://indianconstitution4ba.blogspot.in/2012/08/salient-features-of-indian-constitution.html)

***Module 2*: Fundamental Rights**

Fundamental Rights , Fundamental Duties The Directive Principles of State Policy .

***Module 3*:Union Government**

[Union Government](http://indianconstitution4ba.blogspot.in/2012/10/union-government-of-india.html), Union Legislature (Parliament) , Lok Sabha and Rajya Sabha (with Powers and Functions) , Union Excecutive , President of India (with Powers and Functions) , Prime Minister of India (with Powers and Functions) , Union Judiciary (Supreme Court) , Jurisdiction of the Supreme Court 

***Module 4*: State Government**

[State Government](http://indianconstitution4ba.blogspot.in/2012/10/state-government.html), [State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad)](http://indianconstitution4ba.blogspot.in/2012/10/vidhan-sabha.html), [Powers and Functions of the State Legislature](http://indianconstitution4ba.blogspot.in/2012/10/powers-and-functions-of-state.html), [State Executive](http://indianconstitution4ba.blogspot.in/2012/10/state-executive.html), [Governor of the State (with Powers and Functions)](http://indianconstitution4ba.blogspot.in/2012/10/state-executive.html), The Chief Minister of the State (with Powers and Functions) , [State Judiciary (High Courts)](http://indianconstitution4ba.blogspot.in/2012/10/state-judiciary.html)

***Module 5*:Local Self Government (with Special Reference to Karnataka State)**

Election Commission of India (with Powers and Functions) , The Union Public Service Commission (with Powers and Functions)

**Reference books:**

* M.V.Pylee, “An Introduction to Constitution of India”, Vikas Publishing, 2002.
* M.Govindarajan, S.Natarajan, V.S.Senthilkumar, “Engineering Ethics”, Prentice –Hall of India Pvt. Ltd. New Delhi, 2004

Brij Kishore Sharma,“Introduction to the Constitution of India”, PHI Learning Pvt. Ltd., New Delhi, 2011.

**Course Learning Objectives (CLO)**

* To provide basic information about Indian constitution.
* To identify individual role and ethical responsibility towards society.
* To understand human rights and its implications

**Course Outcomes:**

* Latest Publications of Indian Institute of Human Rights, New Delhi.

After study of the course, the students are able to

* Have general knowledge and legal literacy and thereby to take up competitive examinations
* Understand state and central policies, fundamental duties • Understand Electoral Process, special provisions
* Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, and
* Understand Engineering ethics and responsibilities of Engineers.
* Have an awareness about basic human rights in India

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| **Physics Laboratory** | |
| **Subject Code: 18BSCPY01L Credits:1 Hours/week: 2** | |
|  | |
| **Sl No** | **List of Experiments** |
| 1. | **Resonance in LCR circuits-** Study frequency response of Series and parallel resonance circuits |
| 2. | **Dielectric constant**- Determination of dielectric constant of the given dielectric material by charging and discharging |
| 3 | **Zener diode-** I-V Characteristics of Zener diode |
| 4. | **BH Curve-** Determination of Energy loss, Remnant Flux Density and coercive field of the given ferromagnetic material |
| 5 | **Planck’s constant-** Determination of the Planck’s constant using light emitting diodes |
| 6 | **Stefan’s law**- Verification of Stefan’s law |
| 7 | **Fermi Energy-** Determination of Fermi Energy of given material |
| 8 | **Band gap-** Determination ofEnergy gap of a given semiconductor |
| 9 | **Laser diffraction:** Determination of wavelength of given laser |
| 10 | **Torsional Pendulum-** Determination of moment of inertia of the given irregular body. |

**Objectives:**

* Gain knowledge to use optical/mechanical equipments and basic electrical/electronic circuits to conduct experiments.
* Understand the theoretical concepts of optical, mechanical, electrical/electronic equipments.
* Set up the equipments/connect the circuit and conduct the experiments.

**English Lab**

**Code: 18HSS01L Total Hours: 15**

**Credits: 1 Hours/week: 0:0:1**

UNIT-I : Sounds of English

UNIT-II :Meanings & Sentences

UNIT-III: Mastering Pronunciation

UNIT-IV : Situational Dialogues

UNIT-V: Comprehension Practice

UNIT VI:Poetry Master

UNIT VII: Essay Builder

UNIT VIII: News Hunt

UNIT IX:Letter Writing Guide

UNIT X: Group Discussion

**Course Learning Objectives (CLO)**

**The objective of this course is to make students**

􀀀 Language lab focuses on computer aided multimedia instruction and language acquisition

􀀀 To equip the students with good communication skills with practical knowledge.

***Course Outcome:*** *The lab ensures the learners go beyond the learning of reading and writing,*

*and enhance their listening and speaking skills.*

|  |
| --- |
| **PROGRAMMING LAB**  **Code:** 18ESCS01L **Total Hours: 15**  **Credits: 1 Hours/week: 0:0:2** |

**List of C Programs**

**Following number of program under different concepts as follows:**

**1. Scientific problem solving using decision making and looping. – 2 programs**

**2. Simple programming for one dimensional and two dimensional arrays. – 2 programs**

**3. Solving problems using String functions – 1 program**

**4. Programs with user defined functions – 2 programs**

**5. Program using Recursive Function and conversion from given program to flow chart – 1 program**

**6. Program using structures, unions and pointers(compulsory program on pointers) – 2 programs**

**1** Problem formulation, Problem Solving and Flowcharts.

-Flowchart examples using RAPTOR (To be done in classroom)

**2** C Programming using Simple statements and expressions. (No Evaluation)

- Fahrenheit to Centigrade conversions

- Simple Interest

- Area and Volume of Sphere, Area of Circle

- Pythagoras theorem or any mathematical expressions related programs

- Interchanging/swapping of two numbers with using third variable

**3** Scientific problem solving using decision making and looping. (2 Programs)

a) Largest and smallest of 3 numbers

b) Roots of a Quadratic equation

c) Calculator using switch-case

d) Finding out a number is prime or not

e) Reversing a number

f) GCD/LCM

h) Fibonacci Series

i) Interchanging/swapping of two numbers without using third variable

**4** Simple programming for one dimensional and two dimensional arrays. (2 Programs)

a) Linear Search

b) Binary Search

c) Bubble Sort

d) Matrix (Addition and Subtraction)

e) Matrix Multiplication

**5** Solving problems using String functions (1 Program)

a) Using built-in string functions

b) Sorting and searching of names/strings

c) Reversing a string

**6** Programs with user defined functions (2 Programs)

a) Different types of function calls.

b) Writing functions to perform string operations without using the functions defined in string.

c) Swapping of two numbers (by value and by reference).

d) Simple function calls for experiments mentioned in section 2.

**7** Program using Recursive Function and conversion from given program to flow chart (1 Program)

a) Factorial

b) GCD

c) Linear Search

d) nCr

**8** Program using structures and unions (2 Programs)

a) A structure to create student record read data and prints the data of a student

b) Program to demonstrate the difference between structure and union by displaying size of a structure and a union.

c) A compulsory program on pointers

**Bachelor of Technology**

**Batch: 2020-2023**

*I & II Semester*

*Course Matrix & Syllabus*

*For*

*Chemistry Cycle*

**Course matrix**

**Academic year: 2020-23**

(Common to all branches – **Chemistry Cycle**)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.**  **No.** | **Name of the Subject** | **Credit** | **L–T–P** | **Continues Assessment** | | **Internal Assessment** | | **End Practical**  **Examinations** | | **End Semester**  **Examinations** | | **Minimum**  **Passing Marks** |
| **Max**  **Marks** | **Min.**  **Marks** | **Max.**  **Marks** | **Min.**  **Marks** | **Max.**  **Marks** | **Min.**  **Marks** | **Max.**  **Marks** | **Min.**  **Marks** |
| 1 | Mathematics – 2 | 4 | 3-1-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 2 | Chemistry | 4 | 3-1-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 3 | Basics of Electrical Engineering | 4 | 3-1-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 4 | Workshop Practice | 3 | 1-0-2 | 100 |  |  |  |  |  |  |  | 40 |
| 5 | Sociology and Elements of Indian History for Engineers | 3 | 3-0-0 |  |  | 30 |  |  |  | 70 | 28 | 40 |
| 6 | Chemistry Lab | 1 | 0-0-2 | 100 |  |  |  |  |  |  |  | 40 |
| 7 | Electrical Engineering Lab | 1 | 0-0-2 | 100 |  |  |  |  |  |  |  | 40 |

**Mandatory Course**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **8** | **constitution of India (non-credit)** | **-** | **3-0-0** |  |  | **30** |  |  |  | **70** | **28** | **40** |
|  | **Total** | **20** |  |  |  |  |  |  |  |  |  |  |

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| **BS** | **ES** | **HSS** | **Core** | **DE** | **OE** | **MC** | **SEC** | **Total Credits** |
| 09 | 08 | 03 | -- | -- | -- | 00 | -- | **20** |

**Mathematics - 1**

**Subject Code : 18BS1MA01 Semester : 1**

**Hours/week : 3:1:0 Total Hours : 45 + 15**

**Credits : 4 L-T-P : 3-1-0**

**IA : 30 SEE : 70**

***Module 1: Calculus: (8 lectures+3Tutorials)***

Rolle’s Theorem, Lagrange’s and Cauchy’s Mean value theorems, Taylor’s & MacLaurin’s series for a function of one variable, Evaluation of indeterminate forms by L'Hospital's rule.

***Module 2: Matrices (10 lectures+3Tutorials)***

Rank of a matrix, Echelon form, System of linear equations: Consistency, solution by Gauss elimination and Gauss-Siedel methods, Eigen values and Eigen vectors of square matrices, Diagonalization of square matrices. Conversion of an nth order differential equation to a system of first order linear differential equations, Solution of system of linear differential equations by diagonalization method and discuss the stability of the system.

***Module 3: Calculus: (8 lectures+3Tutorials)***

Reduction formulae (without proof), Evaluation of definite and improper integrals, Beta and Gamma functions and their properties (without proof) and problems

Tracing of standard curves: Strophoid, Leminscate, Cardioid, and Astroid. Applications of definite integrals to evaluate surface areas and volumes of revolutions.

***Module 4: Multivariable Calculus: (9 lectures+3Tutorials)***

Partial derivatives, Total derivative, Jacobians,

Maxima & Minima for function of two variables, Method of Lagrange multipliers, Gradient, Curl, Divergence & Directional derivatives, Vector identities (Statement).

***Module 5: Ordinary differential equations: (10 lectures+3Tutorials)***

Exact, Reducible to exact, Linear and Bernoulli’s differential equations, higher order linear differential equations with constant coefficients

Method of variation of parameters, higher order linear differential equations with variable coefficients: Cauchy and Legendre’s differential equation.

**Assignment : Eigen values, Eigen vectors, solution of the system of differential equations using MATLAB.**

**Note : No questions will be asked from assignment section in the examination.**

**text BooKS**

1. B.S. Grewal; Higher Engineering Mathematics, Khanna Publishers, 41st Edition, 2011.
2. B V Ramana; Higher Engineering Mathematics, 10th Reprint Edition, 2010.

**References**

1. Erwin Kreyszig; Advanced Engineering Mathematics, 9th  Edition, 2012.
2. Dennis G Zill & Michael R Cullen; Advanced Engineering Mathematics, Second Edition; Jones & Barlett Publishers; 2000.

**Course Learning Objectives (CLO)**

The objective of this course is to make students

* Familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra
* To equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

**Course Outcomes**

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

**CO1 :** Understand Mean value theorems and determine the power series expansion of the function

**CO2 :** Determine the Eigen values and Eigen vector to solve system of first order differential

equations

**CO3 :** Evaluation of surface area and volumes of revolution by definite integrals

**CO4 :** Estimate the extreme values of the multivariable function and determine potential functions

for irrotational force fields

**CO5 :** Solve first and higher order ordinary differential equations.

**Mathematics - 2**

**Subject Code : 18BS2MA01 Semester : 2**

**Hours/week : 4 Total Hours : 45 + 15**

**Credits : 4 L-T-P : 3:1:0**

**IA : 30 SEE : 70**

**Prerequisite:**

Set theory, Data classification, mean, median, mode, histogram, frequency polygon, series expansions.

***Module 1: Multivariable Calculus (Integration): (10 lectures+3Tutorials)***

Multiple Integration: Double integrals, change of order of integration, Change of variables, Triple integrals, Applications: areas and volumes, orthogonal curvilinear coordinates

***Module 2: Vector Integration: (8 lectures+3Tutorials)***

Line integrals, surface integrals, volume integrals, Problems on Green, Gauss and Stokes theorem (without proof)

***Module 3: Laplace transforms and Inverse Laplace transform: (10 lectures+3Tutorials)***

Definition, Laplace transforms of elementary functions, properties of Laplace transforms (without proof).

Laplace transforms of periodic functions (without proof), Heaviside function and Dirac’s Delta function.

Inverse Laplace transforms: Definition, transforms of standard functions and properties. Convolution theorem (without proof) and evaluation of inverse Laplace transforms using Convolution theorem. Solution of ordinary differential equations using Laplace transforms.

***Module 4: Complex Variable – Differentiation: (8 lectures+3Tutorials)***

Complex Differentiation, Cauchy-Riemann equations in Cartesian and Polar form, analytic functions, harmonic functions, construction of analytic functions and their properties.

Conformal mappings , Bilinear/Mobius transformations and their properties.

***Module 5: Complex Variable – Integration: (9 lectures+3Tutorials)***

Contour integrals, Cauchy theorem (without proof), Cauchy Integral formula (without proof), Taylor’s series, Laurent’s series. Zeros of analytic functions, singularities, Residues, Cauchy Residue theorem (without proof),

**Assignment : Solution of the system of linear and non-linear differential equations and graphical analysis using MATLAB**

**TEXT BOOKS**

1. B.S. Grewal; Higher Engineering Mathematics, Khanna Publishers, 41st Edition, 2011.
2. B V Ramana; Higher Engineering Mathematics, 10th Reprint Edition, 2010.

**References**

1. Dennis G Zill & Michael R Cullen; Advanced Engineering Mathematics, Second Edition; Jones & Barlett Publishers; 2000.
2. Erwin Kreyszig; Advanced Engineering Mathematics, 9th  Edition, 2012.

**Course Outcomes:**

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

**CO1 :** Apply multiple integrals to find area, surface area and volume

**CO2 :** Evaluate line, surface and volume integrals of vector fields

**CO3 :** Apply Laplace Transforms to solve ordinary differential equations

**CO4 :** Understand thedifferentiation and integration of complex valued functions.

**Course Learning Objectives (CLO)**

The objective of this course is to make students

* Familiarize the prospective engineers with techniques in calculus, multivariate integration, Laplace transforms and differentiation and integration of complex variable
* To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

**CHEMISTRY**

**Subject code: 18BSCH03 Total hours: 60**

**Credits : 3:1:0 Hours/week: 5**

**Module 1. Thermodynamics, Electrochemistry and corrosion (12 Hours)**

**Thermodynamic functions**: Energy, entropy and free energy. Estimations of entropy and free energies. Use of free energy considerations in metallurgy through Ellingham diagrams.

**Electrochemistry:** Electrode potentials: Origin of electrode potential using Nernst electrolytic pressure theory, Introduction to single electrode potential, Derivation of Nernst equation, Electrochemical cell: Construction and working of Daniel cell using Zn and Cu electrodes, electrochemical series, types of electrodes (Hydrogen, Calomel electrode, glass electrode). Numerical problems based on determination of EMF.

**Corrosion**- causes- factors- electrochemical theory of corrosion, types-chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method.

**Module 2. Periodic properties and Molecular structure (12 hours)**

Classification as s, p, d & f block elements, variation of atomic volume, atomic and ionic radii ionization potential, electron affinity and electronegativity along periods and groups, Effective nuclear charge, penetration of orbitals (shielding and de-sheilding), polarizability.

Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. MO Theory and Energy level diagrams – Bonding and antibonding orbitals – Application of MO Theory to H2, He2, N2, O2, HF and CO.

**Module 3. Stereochemistry, Organic reactions and synthesis of a drug molecule (12 Hours)**

Structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations, conformational analysis of alkanes and cycloalkanes.

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule (Aspirin, paracetamol, phenacetin).

**Module 4. Nanomaterials and their spectroscopic characterization (12 Hours)**

Introduction, preparation of nanomaterials: Top down and bottom up approaches, mechanical grinding, wet chemical synthesis (Sol-gel method). Properties of nanomaterials: optical properties, electrical properties, magnetic properties, Applications of nanomaterials.

Principles, instrumentation and applications of UV-Vis spectroscopy (UV-VIS), Infra-red

spectroscopy, X-ray diffraction (powder) and scattering (Scanning Electron Microscope) methods.

**Module 5. Environmental Pollution and waste management (12 hours)**

**Air Pollution**: Types of pollutants, source effects, sink and control of primary pollutants – CO, Nox, HC, Sox and particulates, effects of pollutants on man and environment – photochemical smog and acid rain.

**Water Pollution**: Classification of pollutants, their sources, waste water treatment – domestic and industrial.

**Soil Pollution**: Composition of soil, classification and effects of soil pollutants and their control.

Solid Waste Pollution: Classification, waste treatment & Disposal methods (Composting, sanitary landfilling, thermal processes, recycling and reuse). Hazardous Wastes: Classification – radioactive, biomedical and chemical, treatment and disposal – physical, chemical and biological processes.

**References**

|  |  |  |
| --- | --- | --- |
| **Module** | **Reference** |  |
| 1 | Principles of Physical Chemistry by B.R. Puri , L.R.Sharma & M.S.Pathania  Physical Chemistry, by P. W. Atkins  J.C. Kuriacose, J. Rajaram, Chemistry in Engineering and Technology, Volume I/II, Tata McGraw-Hill Publishing Co. Ltd.New Delhi, 1988.  Engineering Chemistry by Jain & Jain DhanpatRai & Co.Publications. | Thermodynamics  Electrochemistry, Corrosion |
| 2 | Concise Inorganic Chemistry ( 4th Edition) By J. D. Lee  Principles of inorganic chemistry, 2017  by B.R. Puri and L.R. Sharma & K.C. Kalia | Periodic properties and molecular structure |
| 3 | Stereochemistry: Conformation and Mechanism -  P. S. Kalsi  Organic chemistry by Morrison and boyd  A Guidebook to Mechanism in Organic Chemistry by Peter sykes  A Text Book of Organic Chemistry, Arun Bahl & B.S.Bahl | Stereochemistry  Organic synthesis |
| 4 | C. N. R. Rao, Chemistry of Nanomaterials, Volume I and II, Wiley Publication, 1996.  Engineering Chemistry, Shikha Agarwal. –2015,Cambridge university bridge  Fundamentals of Molecular Spectroscopy, by C. N. Banwell  Scanning Electron Microscopy and X-ray Microanalysis, Goldstein, J., Newbury, D.E., Joy, D.C., Lyman, C.E., Echlin, P., Lifshin, E., Sawyer, L., Michael, J.R. | Nano-materials  Spectroscopy |
| 5 | Environmental Chemistry 1st Edition  (English, Paperback, S. C. Bhatia) | Pollution and waste management |

**Basic Electrical Engineering**

**Code: 18ESEE02 Total Hours: 60**

**Credits: 4 Hours/week: 3:1:0**

**Module 1 : DC Circuits (10 hours)**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff’s current and voltage laws, analysis of simple circuits with dc excitation. Time-domain analysis of first-order RL and RC circuits.

**Module 2: AC Circuits (10 hours)**

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**Module 3: Transformers (9 hours)**

Magnetic materials, BH characteristics, Self and mutual inductance, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. (Qualitative Approach)

**Module 4: Electrical Machines (9 hours)**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators. (Qualitative Approach)

**Module 5: Electrical Installations (7 hours)**

Types of switches, two way and three way connections, Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

**Suggested Text / Reference Books**

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
4. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
5. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

**Course Outcomes**

• To understand and analyze basic electric and magnetic circuits

• To study the working principles of transformers and rotating electrical machines

• To introduce the components of low voltage electrical installations

## Sociology & Elements of Indian History

## 

**Code: 18HSSC02 Total Hours: 45**

**Credits: 3 Hours/week: 3:1:0**

**UNIT-I**: **Introduction to History (9 hrs)**

Introduction to History:, History Sources – Archaeology, Epigraphy, Numismatics & Archival Research, Methods used in History – History & Historiography, Indian History & per iodization, Evolution of Urbanization process, Ancient Indian culture, Modern Indian Culture, Status of women in Ancient India.

**UNIT-II: Introduction to Sociology (9 hrs)**

Introduction to Sociology – Organizations, Institutions, Culture, Social Stratification (Caste, Class, Gender & Power) Sociology as a Science, Social Development, Different Social System, Relation between human being and society, Status & Role, Norms and Values, Impact of Science and Technology on Society.

**UNIT-III:** **Feudalism and Colonialism** **(9hrs)**

Feudalism and Colonialism, Entry of British in India, British Expansion and consolidation, Significant events, personalities and issues during the Indian freedom Struggle., Issues and Concerns in post-colonial India, reorganization in the country, Economic development and political change after independence, Industrialization after Independence.

**UNIT-IV**: **Social Problems in India** **(9hrs)**

Social Problems in India, Social Change and Development, Rural development, Social Groups & Processes, types of Groups- Primary& Secondary, Formal-Informal, In group – Out group

Industrial Revolution, Impact (Positive and Negative) of Industrial revolution on Urban Society

**UNIT-V:** **Sociological Perspectives** (**9hrs)**

Sociological Perspectives of Karl Marx, Max Weber, Emile Durkheim, Social Mobility, types of mobility, sources and causes of mobility, Education and social change, Impact of Religion on Society.

**Reference books:**

1. Ahuja, Ram (2001): Indian Social System,New Delhi: Rawat Publication. Ahuja, Ram (2003):
2. Society in India, New Delhi: Rawat Publication. Bottomore, T.B. (1972)
3. Sociology: A Guide to Problems and Literature, Bombay: George Allen and Unwin (India).
4. Fulcher& Scott (2003: Sociology, New York: Anthony (2005):
5. Sociology, Polity Press. Desai, A.R. (2005),
6. Social Background of Indian Nationalism,
7. India After Gandhi, Pan Macmillan Thapur, Romila (2002),
8. Early Penguin Sharma R.S. (1965),

9. Indian Feudalism, Macmillan

**Course Learning Objectives (CLO)**

The students will able to:

● Understand the nature of society and the social structure they live in

and be able to analyze social changes happening around them.

● Assess individuals’ role as an engineer in the society and play as a key

actor of social change.

● Engage with contemporary social issues and able to make an informed

opinions about them.

● Understand various historical stages and important processes India as

a society has undergonepractical oriented skills.

**Course Outcomes:**

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

* Understand the fundamental concepts of Sociology and History
* Apply the concepts of sociology in engineering domain
* Identify and analyze the theoretical concepts and reflect on them in

contemporary social life

## Constitution of India

**Code: 18MCC01 Total Hours:**

***Module 1*: Introduction to Indian Constitution**

[Meaning of the term Constitution](http://indianconstitution4ba.blogspot.in/2012/10/what-is-constitution.html), [Preamble of the Constitution](http://indianconstitution4ba.blogspot.in/2012/08/preamble.html),[Constituent Assembly](http://indianconstitution4ba.blogspot.in/2012/10/the-constituent-assembly.html)[The Salient Features of Indian Constitution](http://indianconstitution4ba.blogspot.in/2012/08/salient-features-of-indian-constitution.html)

***Module 2*: Fundamental Rights**

Fundamental Rights , Fundamental Duties The Directive Principles of State Policy .

***Module 3*:Union Government**

[Union Government](http://indianconstitution4ba.blogspot.in/2012/10/union-government-of-india.html), Union Legislature (Parliament) , Lok Sabha and Rajya Sabha (with Powers and Functions) , Union Excecutive , President of India (with Powers and Functions) , Prime Minister of India (with Powers and Functions) , Union Judiciary (Supreme Court) , Jurisdiction of the Supreme Court 

***Module 4*: State Government**

[State Government](http://indianconstitution4ba.blogspot.in/2012/10/state-government.html), [State Legislature (Legislative Assembly / Vidhan Sabha, Legislative Council / Vidhan Parishad)](http://indianconstitution4ba.blogspot.in/2012/10/vidhan-sabha.html), [Powers and Functions of the State Legislature](http://indianconstitution4ba.blogspot.in/2012/10/powers-and-functions-of-state.html), [State Executive](http://indianconstitution4ba.blogspot.in/2012/10/state-executive.html), [Governor of the State (with Powers and Functions)](http://indianconstitution4ba.blogspot.in/2012/10/state-executive.html), The Chief Minister of the State (with Powers and Functions) , [State Judiciary (High Courts)](http://indianconstitution4ba.blogspot.in/2012/10/state-judiciary.html)

***Module 5*:Local Self Government (with Special Reference to Karnataka State)**

Election Commission of India (with Powers and Functions) , The Union Public Service Commission (with Powers and Functions)

**Reference books:**

* M.V.Pylee, “An Introduction to Constitution of India”, Vikas Publishing, 2002.
* M.Govindarajan, S.Natarajan, V.S.Senthilkumar, “Engineering Ethics”, Prentice –Hall of India Pvt. Ltd. New Delhi, 2004

Brij Kishore Sharma,“Introduction to the Constitution of India”, PHI Learning Pvt. Ltd., New Delhi, 2011.

**Course Learning Objectives (CLO)**

* To provide basic information about Indian constitution.
* To identify individual role and ethical responsibility towards society.
* To understand human rights and its implications

**Course Outcomes:**

* Latest Publications of Indian Institute of Human Rights, New Delhi.

After study of the course, the students are able to

* Have general knowledge and legal literacy and thereby to take up competitive examinations
* Understand state and central policies, fundamental duties • Understand Electoral Process, special provisions
* Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, and
* Understand Engineering ethics and responsibilities of Engineers.
* Have an awareness about basic human rights in India

**CHEMISTRY - LABORATORY**

**Subject Code**: **18BSCH03L Duration: 2 hrs/week**

# PART-A

**1A.** Determination of Active Chlorine Content in Bleaching powder.

**2A.** Adsorption of Acetic acid on Charcoal.

**3A.** Determination of saponification/acid value of an oil

**4A.** Determination of partition coefficient of a substance between two immiscible liquids

**5A.** Synthesis of Thiokol rubber.

**6A.** Thin Layer Chromatography

# PART-B

**1B.** Potentiometric estimation of FAS using standard K2Cr2O7 solution.

**2B**. Conductometric estimation of an acid (HCl) using standard NaOH solution.

**3B.** Determination of Viscosity co-efficient of a given liquid Using Ostwald’s Viscometer

**4B.** Determination of Surface Tension of Lubricants Using Stalagmometer.**.**

**5B.** Determination of the rate constant of a reaction

**6B**. Preparation of Metal oxide nanoparticles.

**Reference**

# Vogel's Qualitative Inorganic Analysis (7th Edition) 7th Edition

1. Text Book of engineering chemistry by R. N. Goyal and Harrmendra Goel, Ane Books Private Ltd.,
2. A textbook on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications (5th Edition)

**Basic Electrical Engineering Laboratory**

**Code: 18ESEE02L Total Hours: 2 hours/week**

**Credits: 3 Hours/week: 0:0:2**

**List of experiments/demonstrations:**

1. Study on working principle and usage of measuring instruments – switches-two way and three way connections, voltmeter, ammeter, multi-meter, oscilloscope, resistors, capacitors and inductors.
2. Measurement of steady-state and transient time-response of R-L, R-C, and R-L-C circuits using storage oscilloscope
3. Determination of Impedance, phase differences between current and voltage and Resonance in R-L-C circuits
4. Study on no load current due to B-H curve nonlinearity and effect of harmonics in transformers. (Simulation)
5. No load test and Full load test on single phase transformer
6. Study on three phase transformer including connection procedure, Voltage and Current relationships, Phase-shifts between the primary and secondary side in star type and delta type.
7. Study on the construction of dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine
8. Load test on separately excited dc motor and plot the Torque Speed Characteristics.
9. Study on the Synchronous speed of two and four-pole, three-phase induction motors.
10. Measurement of Torque-Slip Characteristic of an induction motor

**Laboratory Outcomes**

♣ Get an exposure to common electrical components and their ratings.

♣ Make electrical connections by wires of appropriate ratings.

♣ Understand the usage of common electrical measuring instruments.

♣ Understand the basic characteristics of transformers and electrical machines.

## Workshop Practice

**Code: 18ESCME04L Total Hours: 45**

## Credits: 3 Hours/week: 1:0:2

1. **Manufacturing Methods**- Casting, forming, machining, Joining, Advanced Manufacturing methods ( 4 lectures)
2. **CNC machining** – Basics of NC programming- demo on CNC milling centre- Additive manufacturing – Generic AM process - Pros and Cons- Stereolithography – case study ( 2 lectures)
3. **Fitting operations & power tools** ( 1 lectures) – Fitting shop equipment – Gauges- cutting tools – striking tools – miscellaneous tools – Bench working processes
4. **Carpentry:** Carpentry tools – Dovetail lap joint – Lap joint ( 1 lectures)
5. **Metal casting** - sand casting processes -Green sand Moulding and Casting – pattern making- Melting and Pouring of Metals -–fettling and cleaning of castings - ( 1 lectures) -
6. **Welding (Arc welding & Gas welding)** – welding types- welding procedure- Welding equipment, filler materials, shielding gas- Butt weld- Lap weld – T weld - Brazing ( 1 lectures)

**Reference Books:**

1. *Manufacturing Technology -1,* By P.C Sharma of S.CHAND Publications.
2. *Engineering Materials* by Er.R.K.RAJPUT of S.CHAND Publications
3. *Work shop technology* By R.S KHURMI & J.K GUPTA of S.CHAND & Co.Ltd.

**TEXT BOOKS:**

1. *Elements of Workshop Technology,* Volume-I, Manufacturing Process edition-By Hajra Choudry