

**Important Instructions to be followed while implementing the CBCS scheme for B.E./ B.Pharm./ B.Arch. first Year Students admitted in**

**July 2015 onwards:**

**DEPARTMENTAL INTRODUCTORY COURSE:**

**Applicable to all departmental introductory courses such as**

- a. **AE110**- Introduction to Aeronautical Engineering
  - b. **CE111** - Introduction to Civil Engineering,
  - c. **ME110** - Introduction to Mechanical Engineering,
  - d. **EC111** - Introduction to Electronics and Communication
  - e. **CS111**- Introduction to Computer Science and Engineering
  - f. **IT110** - Introduction to Information Technology
  - g. **EE111**- Introduction to Electrical Engineering
  - h. **CH110** -Introduction to Chemical Engineering
  - i. **EI110** - Introduction to Electronics & Instrumentation Engg. and so on....
- There will be **NO EXAMINATION** in departmental introductory courses **except PY113 Introduction to Pharmacy**. The grades earmarked will be awarded on the basis of internal Assessment.
  - The main objective of *introducing this course is to develop interest among students* for the programme in which they are enrolled.
  - This course is intended to be taken *by the Head of the Department or Senior Professor of the Department*.
  - *Professor (Course Mentor)* is expected to introduce students to the programme in not more than *two introductory lectures* which will be followed by the below listed tasks to be performed individually by the students:
    - i. To look into the major sub-domains of their enrolled programme
    - ii. To look into major Industries and Research Departments working in the area relevant to their programme
    - iii. To find out about the journals and magazines published in the areas relevant to their programme
    - iv. To look into new developments and search about likely jobs, products and companies active in the areas relevant to their programme.
  - Student will have to report to the *Professor at least once in every 15 days* and brief him/her about the progress made in the tasks.

Idea is to broadly introduce students about the programme in two lectures and allow them to explore, learn and understand about the scope, opportunities and current/ future trends in the discipline and its allied domain in a self-study mode. Students will be free to engage in learning from home or library.

**HU112 - RURAL OUTREACH COURSE**

The main objective of introducing this course is to sensitize students about the *socio-cultural* aspects of the rural areas parochial to their colleges. Students are expected to observe, investigate and learn about the following aspects of the rural region:

- i. Demographics, Literacy, Geographical parameters of the Village
  - ii. Schemes of government of India and State of Madhya Pradesh in operation in the villages
  - iii. Social/ Cultural aspects ranging from popular dance forms, music and customs of the concerned village
- There will be **NO EXAMINATION in HU112 Rural Outreach**. The grades earmarked will be awarded on the basis of internal Assessment.
  - This course shall be done by the students in a self-study mode. Study methodology shall comprise of combining field visits, case studies, analyzing policy documents from different government departments, discussions with field officers, active NGO's and so on.
  - The course will not be listed in the time-table and its activities shall be performed by the students *at any time* convenient to them.
  - The faculty associated with the course shall evaluate the candidate and grade him.
  - For evaluation purpose, students are expected to submit a *hand-written summary* on the government schemes and policies for the socio-cultural development of the concerned village. This shall be followed by final submission of two case studies covering broad spectrum of socio-cultural issues ranging from life in slums, infant mortality, watershed management, potability of water, animal welfare etc. These case studies (handwritten) shall be submitted to the mentor for the final evaluation of the coursework.

**HU111- COMMUNICATION COURSE**

- There will be **NO EXAMINATION** in HU111 communication course. The grades earmarked will be awarded on the basis of internal Assessment.
- Students are advised to read at least 3 books (novels, short stories, poems) written in English by authors of Indian origin.
- Genres may range from *Art, Culture, Business, Classics, Psychology, Travel, Science, Sports and Poetry* leaving aside all other genres.
- Students are expected to read actively and critically.
- Each student will have to make a separate choice of books depending upon his/ her interest at the time of course-registration in consultation with the course coordinator.
- Course Coordinator while recommending a book must ensure the book's level to be at least above 10<sup>th</sup> standard.
- The set of books must contain at least one book covering following themes:
  - a. Biography or Autobiography of any of the eminent Indian in the field of science, technology, engineering and sports

**OR**

  - b. Books by Indian Industrialists/ Innovators in the areas of science, technology and engineering
- Any book(s) that is objectionable or is banned by the *Government of Madhya Pradesh* for any reasons whatsoever will not be permitted for the course.
- One book is expected to be read in a period of not more than *20 days* after which students have to submit a *hand-written* review briefing the following aspects:
  - i. Relevance of the book title to the content
  - ii. About the main character and other characters
  - iii. Setting of the book
  - iv. Main Idea/ Theme of the book
  - v. Write précis and make presentation in consultation with the teacher
  - vi. Write 3 quotations from the book
  - vii. Message of the book and the student take away

- Other **NO EXAMINATION** courses as listed below. The grades in these courses will be awarded on the basis of Internal Assessment only.
  - a. **ML 110 --Environmental Sciences**
  - b. **ME 113 -Manufacturing Practices**
  - c. **CS 110 -Computer Programming**

**HU110 ENGLISH**

**HU110**

**ENGLISH**

**3-0-2**

**COURSE OBJECTIVE:**

The objective of this foundational course is to develop the second language learners' ability to use the four fundamental language skills – listening, speaking, writing and reading. The objective of this laboratory is to practice English phonetics through audio & visual aids and computer software. It intends to enable student to speak English correctly with confidence.

**COURSE CONTENT:**

Grammar – Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations.

Vocabulary Development – Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Derivation from root words, Jargon, Scientific Jargon.

Developing Reading Skills – Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, note-making, note-taking, Reading comprehension of technical material and SQ3R reading technique

Developing Writing Skills – Planning, Drafting & Editing, Writing with style, right-words selection, writing effective sentences, developing logical paragraphs, art of condensation, précis, essay, technical definition and technical description

Business Correspondence – Business Letters, Parts & Layouts of Business Letters, Writing Resume/ Application Calling/ Sending Quotations/ Orders/ Complaints and E-mails

**Topics for the Laboratory:**

1. Basic Grammar & Vocabulary Practice (Synonyms, Antonyms, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, Proverbs, Common Errors).
2. Phonetic Symbols, Pronunciations
3. Listening Skills – Including Listening Comprehension
4. Extempore and JAM (Just a Minute Session)
5. Role Play – I
6. Role play – II
7. Body Language
8. Debate
9. Oral Presentation – Preparation & Delivery using Audio – Visual Aids with stress on body language and voice modulations. (Topics to be selected by the Instructor)

**COURSE OUTCOMES**

Student after successful completion of course must possess sound language skills. They must also feel confident in communicating their ideas and feelings. After laboratory exercises, students must possess sound language skills. They must also feel confident in communicating their ideas to others.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

**REFERENCES**

*A.J. Thomson and A.V. Martinet, A Practical English Grammar, Oxford IBH Pub*  
*Sanjay Kumarm Pushp Lata, English for Effective Communication, Oxford*

**COURSE OBJECTIVE:**

The objective of this course is to help students to acquire reading and writing skills in a self-learning mode.

**COURSE CONTENT:**

**Exercises to be performed by students:**

- Reading text selection from the list given below
- To write a book-review

**COURSE OUTCOMES**

Student after successful completion of course must possess sound comprehension skills. They must also feel confident in writing reviews and comments on the read material.

**EVALUATION**

Evaluation will be continuous an integral part of the class. Assessment will be based on assignments, presentations, and interview of each candidate.

**COURSE OBJECTIVE:**

The objective of this foundational course is to review mathematical concepts already learnt in higher secondary. This course will also introduce fundamentals of mathematical functions, derivatives and aspects of calculus to students.

**COURSE CONTENT:**

Recapitulation of Mathematics: Basics of Differentiation, Rolle's and Lagranges Theorem, Tangents and Normals, Indefinite Integral (Substitution, Integration using Trigonometric Identity & Integration by Parts & Definite Integral).

Ordinary Derivatives & Applications: Expansion of functions by Maclaurin's & Taylor's Theorem (One Variable), Maxima and Minima of functions of two variables, Curvature (Radius, Center & Circle of Curvature for Cartesian Coordinates), Curve Tracing.

Partial Derivatives & Applications: Definition, Euler's Theorem for Homogeneous Functions, Differentiation of Implicit Functions, Total Differential Coefficient, Transformations of Independent Variables, Jacobians, Approximation of Errors.

Integral Calculus: Definite Integrals as a Limit of Sum, Application in Summation of series, Beta and Gamma functions (Definitions, Relation between Beta and Gamma functions, Duplication formula, Applications of Beta & Gama Functions).

Applications of Integral Calculus: Multiple Integral (Double & Triple Integrals), Change of Variables, Change the Order of Integration, Applications of Multiple Integral in Area, Volume, Surfaces & Volume of Solid of Revolution about X-Axis & Y-Axis.

**COURSE OUTCOMES**

The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concepts of mathematical functions, partial derivatives as well as fundamentals and applications of integral calculus.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson Education, 2002 (Indian Edition).*

*B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007.*

*Potter, Goldberg & Edward, Advanced Engineering Mathematics, Oxford University Press.*

*S. S. Shastry, Engineering Mathematics, PHI Learning*

*C.B. Gupta, Engineering Mathematics I & II, McGraw Hill India, 2015*

**COURSE OBJECTIVE:**

The objective of this foundational course is to review mathematical concepts already learnt in higher secondary. This course deep understanding of matrix, differential equations as well as a strong sense of how useful the subject can be in other disciplines of learning.

**COURSE CONTENT:**

Matrices & Linear Systems: Rank of a Matrix (By reducing it to Elementary Transformation, Echelon & Normal Forms), Solution of Simultaneous equations by Elementary Transformation Methods, Consistency & Inconsistency of Equations, Eigen Values & Eigen Vectors, Cayley- Hamilton Theorem..

Ordinary Differential Equations-I: First-order differential equations (Separable, Exact, Homogeneous, Linear), Linear differential Equations with constant coefficients.

Ordinary Differential Equations-II: Homogeneous linear differential equations, Simultaneous linear differential equations. Second-Order Linear Differential Equations with Variable Coefficients: Solution by Method of Undetermined Coefficients, ByS Known Integral, Removal of First Derivative, Change of Independent Variable and Variation of Parameters.

Partial Differential Equations-I: Definition, Formulation, Solution of PDE ( By Direct Integration Method & Lagranges Method), Non-Linear Partial Differential Equation of First order {Standard I, II, III & IV), Charpit's General Method of Solution Partial Differential equations.

Partial Differential Equations-II: Partial Differential Equations with Constant Coefficients (Second and Higher Orders Homogeneous and Non- Homogeneous equations), Partial differential Equations Reducible to equations with constant coefficients, The Method of Separation of Variables.

**COURSE OUTCOMES**

The curriculum of the Department is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concepts of matrix, differential equations and their applications.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

- Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, 2013.*  
*E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons Inc.*  
*Michael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson Education, 2002 (Indian Edition).*  
*B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company, 2007.*  
*Shanti Narayan, A Course of Mathematical Analysis. S. Chand & Co. Delhi.*  
*Marwaha, Introduction to Linear Algebra, PHI Learning.*

**ML110 ENVIRONMENTAL SCIENCES**

ML110

ENVIRONMENTAL SCIENCES

1-0-2

**COURSE OBJECTIVE:**

This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it, environmental ethics and its protection through lectures, presentations, documentaries and field visits.

**COURSE CONTENT:**

**Introduction:** Domestic and Global Environmental concerns, principles of sustainable development, Sustainable agriculture, organic farming, bio-fuels, Threats for sustainability

**Environmental Ethics & Legislations:** Enforcement of Environment laws in India – The water act, The Air (Prevention and Control of Pollution) Act, 1981, The Environment (Protection) Act, 1986, Environmental Auditing

**Environmental Pollution:** Air Pollution – sources, types of air pollutants, National Ambient Air Quality Standards, Controlling Air Pollution. Water pollution – sources, types of water pollutants, water quality indicators, water quality standards. Soil Pollution - types of soil pollutants: industrial wastes, pesticides, fertilizers and manures, salination of soil, Controlling Soil Pollution.

**Environmental Challenges:** Local Challenges - Solid Waste – Impact of solid waste on natural resources, Deforestation; Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading.

**Sustainable habitat, industrialisation and urbanization:** Concept of Green Building, Volatile Organic Compounds (VOC), GRIHA Rating, LEED Rating, HVAC, Hybrid Car Technology, Industrial ecology, India's renewable energy capacity. *Green Technology & Green Business:* Green Business, Green Computing, E-waste management.

**COURSE OUTCOMES**

Student after successful completion of course must possess an understanding of environment, eco-system and its consequences of unbalancing the environment. After successful completion of this course, student will earn 2 credits.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*R. Rajagopalan, Environmental Studies, Oxford IBH Pub, 2011.*  
*Kogent Learning Solutions Inc., Energy, Environment, Ecology and Society, Dreamtech, 2012.*  
*Rag, R. L, Ramesh, Lekshmi Dinachandran, Introduction to sustainable engineering*

### COURSE OBJECTIVE:

This course introduces students about the basic fundamentals of Information Technology (IT). Students are expected to learn about applications of IT in communication, multimedia, internet and cloud computing.

### COURSE CONTENT:

Data and Information: Introduction, Type of data, Simple model of computer.

Data processing using a computer: Introduction to Operating System, Data storage Media, High capacity network storage media.

Introduction to Database Management System; Database modelling; Relational model; Distributed DBMS; Data warehouse, Data mining; Classification of Language and Applications

IT Application in Communication: Network services-telephone services, Cellular telephone services, Radio and TV broadcasting, Audio-Visual conferencing, Video-on-demand.

Internet Technology: Introduction, Working of internet, Introduction to network protocol and topologies, Types of network: LAN, WAN, Web browser.

Internet Services: E-mail, Telnet, FTP, WWW, HTML, URL.

IT Application in Multimedia: Introduction, Components of multimedia and challenges, Video compression, Video coding technology: JPEG, MPEG, And JBIG.

Introduction to cloud computing: Types, Services, Models, Characteristics, Benefits and Challenges, Application, Limitations.

IT Application in E-Commerce and E-Governance: Introduction, Different Types of E- Commerce with examples, Advantages and disadvantages, E-Commerce in India, E-Services, E-Commerce security, Internet security and ethics, Technology issues, Social issues, Introduction to E-Governance, Challenges, Application, advantages, Case study of MP-online and IRCTC

Social impact of information technology: Introduction, Social Uses of World Wide Web, Social networking Services, Privacy, security and integrity of Information ,Disaster recovery Intellectual property rights, IT Enabled Services and careers, Career in information technology, Case study of NPTEL.

### EVALUATION

Evaluation will be continuous an integral part of the class only through internal assessment

### REFERENCES:

*V.Rajaraman, Introduction to Information Technology; PHI*  
*E Balagurusamy, Fundamentals of Computers, TMH*  
*Santiram Kal Basic Electronics, PHI*  
*M.N. Rao Cloud Computing, PHI*

**CE111 INTRODUCTION TO CIVIL ENGINEERING**

**CE111**

**INTRODUCTION TO CIVIL ENGINEERING**

**0-0-4**

**COURSE OBJECTIVE:**

This course introduces students to civil engineering and its sub-domains. Students are expected to learn about scope, current and future trends in infrastructure industry, jobs, innovations & research opportunities in the field of civil engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

**COURSE CONTENT:**

Overview of Civil Engineering, types of Infrastructures, Effect of infrastructure facilities on economy and environment, Role of Civil Engineers in the infrastructural Development Introduction to sub-domains of Civil Engineering, Size of Infrastructure Industry, emerging trends in infra spending through public and public-private partnership (PPP), talent shortage, and global trends in workforce mobility and skill-demands.

Stages in the life of construction – Design, Construction, Maintenance, Repair, Demolition/Recycling; an overview of Indian Standards, units and conversion factors for Lengths, Areas, Volumes and Weights; Opportunities and challenge of India's Infrastructure, Interdisciplinary nature of Civil Engineering Projects.

Roads: Types of Roads, Nagpur Road Plan, Components of Road and their function; Bridges: Important parts of bridges, classification of bridges; Types of Dams.

Properties and classification of common building materials – Stones, Bricks, Sand, Limes, Cement, Mortar, Concrete, Steel.

Overview of Indian Road Congress, National Highway Authority of India (NHAI) and American Society of Civil Engineers (ASCE), Emerging areas and new technologies in the field of civil engineering.

**COURSE OUTCOMES**

After successful completion of course, Students are expected to possess an in-depth understanding and knowledge about the scope, current and future trends in infrastructure industry, elementary terminologies, learning resources and career-opportunities in the field of civil engineering and its allied domains.

**EVALUATION**

Evaluation will be continuous an integral part of the class only through internal assessment

**REFERENCES**

*Elements of Civil Engineering by MD Saikia, B Mohan Das, MM Das, PHI Learning Private Limited, 2015*

*Prakash M.N. Shesha, Ganesh B., A Textbook on Elements of Civil Engineering, PHI Learning Pvt. Ltd.*

*Study material provided by the instructor*

**COURSE OBJECTIVE:**

The primary objective of the course is to introduce concepts in engineering design to students from all the engineering disciplines. This course broadly covers the prerequisites for an innovative design followed by concepts of products design cycle right from planning, designing, manufacturing, distributing and its usage.

**COURSE CONTENT:**

Introduction to engineering Design process: Its importance, types of designs, various ways to think about design like visualization, photography etc, simplified iteration model, design versus scientific method, a problem solving methodology.

Considerations of a good design Achievement of performance requirements, Total life cycle, Regulatory and social issues in Indian context

Description of Design Process Conceptual Design, Embodiment Design, Detail Design, Planning for Manufacture, Planning for distribution, Planning for Use, Planning for the retirement of the product.

Product Design Cycle, Identification of customer needs and market research essentials, concept generation, technology and market assessment

An exposure to various aspects of design including visual, creative and user-centric design (Visual merchandising, trends, materials, technology and techniques). Evolution in Transportation and Communication Technology, Bullock Cart to Lear Jets, Personal messengers to Cell Phones, Fighter planes

Introduction to any one as a case study:

1. Communication Design
2. Industrial Design
3. IT Integrated Design
4. Textile Design
5. Inter disciplinary Design

**COURSE OUTCOMES**

Student after successful completion of course must possess an understanding of various concepts of design, product design cycle, and significant principles inevitable for design of any engineering product or services.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*George E. Dieter and Linda C. Schmidt, Engineering Design, McGraw Hill Education (India) Pvt. Ltd.*  
*Arvid Eide, Introduction to Engineering Design, McGraw Hill.*  
*Otto. K and Wood, K, Product Design, Pearson Education*

### COURSE OBJECTIVE:

This course introduces students to mechanical engineering and its sub-domains. Students are expected to learn about scope, current and future trends, jobs, innovations & research opportunities in the field of mechanical engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

### COURSE CONTENT:

What is Engineering, Who are Mechanical Engineers, Overview of Mechanical Engineering, its domains, scope and its utility in different areas; Specializations available with in mechanical Engineering (thermal, production and design) and job opportunities in mechanical Engineering.

Basic definitions of terms related to Thermodynamics, First and Second law of Thermodynamics, Properties of Steam, Introduction to Boilers, Terminology of IC Engines, Two and Four Stroke Petrol and Diesel Cycle.

Introduction to mechanical properties, basic manufacturing processes, pattern, type and its use in metal casting, Introduction of welding, brazing and soldering processes

Case study on any topic from Manufacturing Engineering Magazine Published by Society of Manufacturing Engineers (USA), Machinist Magazine, Technorama published by Institution of Engineers (India) and Manufacturing Today and any other magazine related to mechanical engineering..

Overview of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Society of Automotive Engineers, American Society of Mechanical Engineers (ASME); Indian Society of Mechanical Engineers (ISME) etc ; Emerging areas and new technologies in the field of mechanical engineering (3D Printing)

### COURSE OUTCOMES

After successful completion of course, Students are expected to possess basic understanding and knowledge about the scope, current and future trends in mechanical engineering. The versatility of the mechanical engineering branch and career-opportunities in this field will enable the students to explore the new avenues in their future endeavours.

### EVALUATION

Evaluation will be continuous an integral part of the class only through internal assessment

### REFERENCES

*Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning.*  
*Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis*

**COURSE CONTENT:**

**SIGNALS:** Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, Sequence Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, Triangular Pulse Function, Signum Function, Sinc Function, Gaussian Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Non-periodic Signals, Energy and Power Signals, Causal and Non-causal Signals, Even and Odd Signals.

**DIODE AND ITS CIRCUITS:** Introduction to Semiconductor theory: Classification of materials- Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors- Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Diode, V-I characteristics, Limiting Values of PN Diode, Breakdown in PN Diode, Applications of PN Diode.

Zener Diode: V-I Characteristics, Applications of Zener Diode.

Rectifier Circuits: PN Diode as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Full Wave Bridge Rectifier, Clipping Circuits, Clamper Circuits.

**NUMBER SYSTEMS:** Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice-versa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and vice-versa, Binary to Hexadecimal Conversion and vice-versa, Octal to Decimal and vice-versa, Octal to Hexadecimal and vice-versa.

Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement.

Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers, Codes.

**BOOLEAN ALGEBRA AND LOGIC GATES:** Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean Algebra, Boolean Functions, Complement of Boolean Function.

Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic.

**COMMUNICATIONS SYSTEMS:** Introduction to Communication Systems, Elements of Communication Systems: Transmitter, Channel, Receiver, Noise. IEEE Frequency Spectrum Used in Communication Systems: Frequency Bands, Units of Measurement and Abbreviations, Bandwidth and other Parameters, Spectrum Assignment and Regulation. Need of Modulation, Amplitude Modulation, Frequency Modulation, Communication Media and its Classification: Guided and Unguided Propagation.

**EVALUATION**

Evaluation will be continuous an integral part of the class followed by final examination.

**REFERENCES**

*Hwei P. Hsu, Schaum's Outline of Signals and Systems, McGraw-Hill.*

*A.V. Oppenheim, A.S. Willsky, S Hamid Nawab, Signals and Systems, PHI.*

*A Anand Kumar, Signals and Systems, PHI.*

*Basics of Electronics Engineering, Wiley India Pvt. Ltd.*

**COURSE CONTENT:**

**SIGNALS:** Introduction, Representation of Discrete-time Signals: Graphical Representation, Functional Representation, Tabular Representation, Sequence Representation. Elementary Signals: Unit Step Function, Unit Ramp Function, Unit Parabolic Function, Unit Impulse Function, Sinusoidal Signal, Real Exponential Signal, Complex Exponential Signal, Rectangular Pulse Function, Triangular Pulse Function, Signum Function, Sinc Function, Gaussian Function. Basic Operations on Signals: Time Shifting, Time Reversal, Amplitude Scaling, Time Scaling, Signal Addition, Signal Multiplication. Classification of Signals: Deterministic and Random Signals, Periodic and Non-periodic Signals, Energy and Power Signals, Causal and Non-causal Signals, Even and Odd Signals.

**FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS:** Introduction, Representation of Fourier Series, Existence of Fourier Series, Trigonometric Form of Fourier Series: Evaluation of Fourier Coefficients of the Trigonometric Fourier Series, Cosine Representation (Alternate Form of the Trigonometric Representation), Wave Symmetry: Even or Mirror Symmetry, Odd or Rotation Symmetry, Half Wave Symmetry, Quarter Wave Symmetry. Exponential Fourier Series: Determination of the Coefficients of Exponential Fourier Series, Trigonometric Fourier Series from Exponential Fourier Series, Exponential Fourier Series from Trigonometric Fourier Series, Cosine Fourier Series from Exponential Fourier Series. Properties of Continuous-Time Fourier Series: Linearity Property, Time Shifting Property, Time Reversal Property, Time Scaling Property, Time Differentiation Property and Time Integration Property.

**Unit-III DIODE AND ITS CIRCUITS:** Introduction to Semiconductor theory: Classification of materials- Insulators, conductors and semiconductors and their Energy Bands, Types of semiconductors- Intrinsic, Extrinsic. PN Junction Diode: Biasing and operation of PN Diode, V-I characteristics, Limiting Values of PN Diode, Breakdown in PN Diode, Applications of PN Diode. Zener Diode: V-I Characteristics, Applications of Zener Diode. Rectifier Circuits: PN Diode as a Rectifier, Half Wave Rectifier, Full Wave Rectifier, Full Wave Bridge Rectifier, Clipping Circuits, Clamper Circuits.

**NUMBER SYSTEMS:** Introduction, Binary Number System, Octal Number System, Decimal Number System, Hexadecimal System, Conversions: Binary to Decimal conversion and vice-versa, Octal to Decimal Conversion and vice versa, Hexadecimal to Decimal Conversion and vice-versa, Binary to Hexadecimal Conversion and vice-versa, Octal to Decimal and vice-versa, Octal to Hexadecimal and vice-versa. Complements: One's Complement, Two's Complement, Nine's Complement, Ten's Complement. Binary Arithmetic (addition, subtraction, multiplication, division), Octal Arithmetic, Hexadecimal Arithmetic, Signed Numbers, Floating Numbers, Codes.

**BOOLEAN ALGEBRA AND LOGIC GATES:** Introduction, Definitions, Principle of Duality, Basic Theorems, Applications of Boolean Algebra, Boolean Functions, Complement of Boolean Function. Logic Gates (Symbol, Truth Table, Logic Diagram): And, OR, NOT, NAND, NOR, XOR, XNOR. Universal Gates: NAND Gate and NOR Gate implementation, Realization of other Logic Operations using NAND/NOR. Buffer, Negative and Positive Logic, Mixed Logic.

**EVALUATION**

Evaluation will be continuous an integral part of the class followed by final examination.

**REFERENCES**

*Hwei P. Hsu, Schaum's Outline of Signals and Systems, McGraw-Hill.*  
*A.V. Oppenheim, A.S. Willsky, S Hamid Nawab, Signals and Systems, PHI.*  
*A Anand Kumar, Signals and Systems, PHI.*  
*Basics of Electronics Engineering, Wiley India Pvt. Ltd.*

**COURSE OBJECTIVE:**

1. To familiarize with the basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy
2. To familiarize with the production of simple models in the above trades.

**COURSE CONTENT:**

**FITTING:** Tools & Equipments – Practice in filing. Making Vee Joints, Square, Dovetail joints and Key making - plumbing.

*Suggested Mini project – Assembly of simple I.C. engines*

**CARPENTRY:** Tools and Equipments- Planning practice. Making Half Lap, Dovetail, Mortise & Tenon joints.

*Suggested Mini project - model of a single door window frame.*

**SHEET METAL:** Tools and equipments– practice. Making rectangular tray, hopper, scoop, etc.

*Suggested Mini project - Fabrication of a small cabinet, dust bin, etc.*

Tools and equipments - Arc welding of butt joint, Lap joint, Tee fillet. Demonstration of gas welding, TIG & MIG welding.

**SMITHY:** Tools and Equipments – Making simple parts like hexagonal headed bolt, chisel.

**FOUNDRY:** Tools and Equipments, Mould making, conducting casting operation of a job

**COURSE OUTCOMES**

1. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
2. An ability to design and conduct experiments
3. An ability to design a system, component, or process to meet desired needs .ethical, health and safety, manufacturability, and sustainability
4. An ability to use the techniques, skills, and modern engineering tools necessary for Engineering practices

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*S K Hazara Choudhary, Gopal.T.V, Kumar.T, and Murali.G, “A first course on workshop practice – Theory, Practice and Work Book”, Suma Publications, Chennai, 2005.*

*Kannaiah.P and Narayanan.K.C, “Manual on Workshop Practice”, Scitech Publications*

*Venkatachalapathy.V.S, “First year Engineering Workshop Practice”, Ramalinga Publications*

**COURSE OBJECTIVE:**

1. To familiarize with the construction of geometrical figures
2. To familiarize with the projection of 1D, 2D and 3D elements
3. To familiarize with the sectioning of solids and development of surfaces
4. To familiarize with the Preparation and interpretation of building drawing

**COURSE CONTENT:**

**Projections of Points, Straight Lines and Planes:** Types and use of Lines, Lettering & Dimensioning, Various types of projection System, Projection of Points in different quadrants, projections of lines and planes for parallel, perpendicular & inclined to horizontal and vertical reference planes.

**Projections Solids and Development of Surfaces:** Cylinder, Cone, Pyramid, & Sphere with axes parallel, perpendicular & inclined to both reference planes. Development of surfaces of various solids. Sections of Solids Section planes, Sectional views, True shape of Sections for Prism, Cylinder, Pyramid, and Cone & Sphere. Orthographic Projections of Simple objects and Machine Components like Bolts and Screw.

**Isometric projections:** Isometric scales, isometric views of Simple objects.

**Introduction to computer-aided drafting (CAD):** Cartesian and Polar Co-ordinate system, Absolute and Relative Co-ordinates systems; Basic drawing commands: Line, Point, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Basic editing Commands: Basic Object Selection Methods, Window and Crossing Window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror. Display Commands: Zoom, Pan, Redraw, and Regenerate; Simple dimensioning and text, Simple exercises.

**Solid modelling:** Basics of 2-D solid modelling

**LABORATORY**

Drawing for topics covered in the theory as suggested by the course coordinator.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*N.D. Bhatt and V.M.Panchal, Engineering Drawing Plane and Solid Geometry, Charotar Publishing House.*

*James leach, AutoCAD 2015 Instructor, SDC Publications*

**COURSE OBJECTIVE:**

1. To familiarize with the basic concept of Mechanical Engineering
2. To familiarize with the scope of Mechanical Engineering
- 3 To familiarize with the job prospects of Mechanical Engineer

**COURSE CONTENT:**

**MANUFACTURING PROCESSES:** Sheet Metal Work processes (applications, advantages/disadvantages). Welding: Types – Equipments– Tools and accessories – Techniques employed - applications, advantages / disadvantages – Gas cutting – Brazing and soldering. Lathe Practice: Types - Description of main components – Cutting tools – Work holding devices – Basic operations. Simple Problems. Drilling Practice: Introduction – Types – Description – Tools. Simple Problems.

**POWER GENERATION:** External and internal combustion engines Auto diesel & dual cycles, comparative study – Hydro, thermal and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). Simple Problems. Introduction to Steam water and gas turbines, basics of Rankine & Joule cycle, centrifugal pumps.

**MACHINE ELEMENTS:** Springs: Helical and leaf springs – Springs in series and parallel. Cams: Types of cams and followers – Cam profile Power Transmission: Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. Simple problems. Introduction to mechanisms, four bar chain , inversions .

**THERMAL ENGINEERING:** Basic concepts of thermodynamics , Concept of system ,Introduction to Zeroth , first & second law of thermodynamics , salient features of steam boilers , accessories & mountings ,High pressure boilers Basic modes of heat transfer Fourier's law , Stefan Boltzmann's law ,Newton's law . Concept of refrigeration & air conditioning, ton of refrigeration, COP. working of domestic refrigerator & air conditioner

**MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS:** Mechanisms of plastic deformation, slip and twinning – Types of fracture –mechanical Properties of materials , Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms. Ferrous & non ferrous materials, non metallic materials, Alloys & phase diagram.

**LABORATORY**

Experiments as suggested by the course coordinator.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning.*  
*Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis*

**COURSE OBJECTIVE:**

1. To familiarize with different branches of mechanics
2. To familiarize with Static equilibrium of particles
3. To familiarize with Properties of surfaces and volumes.
4. To familiarize with fundamental concepts of dynamics

**COURSE CONTENT:**

**Coplanar Concurrent Forces:** Introduction to Engineering Mechanics: What is Engineering Mechanics? Classification of Engineering Mechanics, Statics, Dynamics, Kinematics, Kinetics etc. Fundamental Laws of Mechanics.

**Resolution and Composition of Forces:** Force, Pressure and Stress, Free Body Diagram , Bow's Notation, Characteristics and Effects of a Force, System of Forces, Resolution of a Force, Composition of Forces, Resultant / Equilibrant Force, Law of Parallelogram of Forces, Law of Triangle of Forces, Polygon Law of Forces, Lami's Theorem, Equilibrium of a Body Under Two / Three/More Than Three Forces. Law of Superposition of Forces.

**Coplanar Non Concurrent Forces:** Moment of a Force, Principle of Moments/ Varignon's Theorem, Parallel Forces : Resultant of Parallel Forces, Couple: Moment of a Couple, Resolution of Force into a Couple. Coplanar Non Concurrent Forces: Resultant of Coplanar, Non Con-Current Forces.

**Beams:** Types of Beams: Simply Supported Beam, Overhanging Beam, Cantilever Beam. Types of Supports of a Beam or Frame: Roller, Hinged and Fixed Supports. Load on the Beam or Frame: Different Types of Loading. Support Reaction of a Beam or Frame: Analytical Method. Truss Analysis: Method of Joints & Sections.

**Centroid and Centre of Gravity:** Centroid, Centre of Gravity, Determination of Centroid of Simple Figures, Centroid of Composite Sections. Centre of Gravity of Solid Bodies. Area Moment of Inertia: Basic Concept of Inertia, Definition of Moment of Inertia, Theorems of Moment of Inertia, Radius of Gyration, Polar Moment of Inertia of Standard Sections, Moment of Inertia of Composite Section, Principal Moment of Inertia , Mass Moment of Inertia.

**Introduction to Dynamics:** Overview of Dynamics, Basic Concepts and Terms Used in Dynamics, Motion, Types of Motion, Newton's Laws of Motion, Newton's Law of Gravitation.

**COURSE OUTCOMES**

1. An ability to apply knowledge of mathematics, science, and engineering
2. An ability to identify, formulate, and solve engineering problems

**LABORATORY**

Experiments as suggested by the course coordinator.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*KL Kumar, Engineering Mechanics, Tata McGraw- Hill Education*  
*Ferdinand.P. Beer. E, Russell Johnston Jr., David Mazurek, Philip J Cornwell, "Vector Mechanics for Engineers: Statics and Dynamics" , McGraw - Hill*  
*Timoshenko, and Young, "Engineering Mechanics", Tata Mc-Graw Hill*  
*P.N. Chanchandramouli, Engineering Mechanics, PHI Learning Private Limited.*

**COURSE OBJECTIVE:**

The objective of this foundational course is to develop general familiarity and understanding with the following areas in chemistry: inorganic, organic, physical chemistry, electrochemistry, photochemistry and Thermochemistry. The course also intended to make students work effectively and safely in the laboratory working environment. Last portion of curriculum addresses critical thinking and numerically analyzing the chemical problems.

**COURSE CONTENT:**

**Molecular Structure & Bonding:** VSEPR Model, Valance-Bond Theory, Molecular Orbital Theory, Molecular Orbital of Polyatomic Molecules.

**Electrochemistry:** Arrhenius theory of electrolytic dissociation, Transport Number, Kohlrausch's Law, Solubility Product, Redox Reaction, Electrochemical & Concentration Cells.

**Chemical & Phase Equilibria:** Phase Diagram for single component system (Water), Phase diagram for Binary Eutectic System (Copper-Silver), Corrosion of metals in acids, Corrosion by Oxygen, Corrosion by Metal Contact.

**Reaction Dynamics:** Order, Molecularity, Rate Law, Methods of determining order of reaction (1<sup>st</sup> & 2<sup>nd</sup> Order).

**Polymers & Polymerization:** Monomers, Polymers, their classification, thermoplastics & thermosetting with examples, Bio-Polymerization, Bio-Degradable Polymerization, Preparation, Properties & Technical Applications of PVC, PVA, Teflon, Nylon6, & Nylon6:6, Polyester, Phenol-Formaldehyde, Urea-Formaldehyde, Natural & Synthetic Rubber, Vulcanization of Rubber.

**Photochemistry:** Photo-excitation of organic molecules, Jablonski Diagram, Laws of Photochemistry and quantum yield, some examples of photochemical reactions, chemistry of vision and other applications of photochemistry.

**Thermochemistry:** Fundamental concept of first law, work, heat, energy and enthalpies, relation between  $C_v$  &  $C_p$ . Second Law: Entropy, Free Energy, (The Helmholtz and Gibbs) and chemical potential.

Numerical problems based on water analysis and water softening process. Determination of hardness by complexometry, Alkalinity and its determination and their relevant numerical problems, testing of lubricating oils, viscosity and viscosity index, flash & fire point, cloud & pour point, Aniline Point, Carbon Residue, Steam-emulsion number, Neutralization number, Saponification number.

**LABORATORY**

Experiments as suggested by the course coordinator.

**COURSE OUTCOMES**

Student after successful completion of course must possess skills to think critically and analyze chemical problems. They must also feel confident to work in teams as well as independently. Students are also expected to learn solving chemistry problems with an engineering purview. Laboratory work is intended for students to learn conducting experiments, and analyze experimental data.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

REFERENCES

*Lee, J. D, Author, Concise Inorganic Chemistry, Oxford University Press*

*Alberty, R. A., Physical Chemistry, John Wiley and Sons*

*N. Krishnamurthy, P. Vallinayagam, Engineering Chemistry, PHI Learning Pvt. Ltd.*

*Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology, Tata McGraw Hill.*

**COURSE CONTENT:**

**Elasto-dynamics:** Simple Harmonic Motion, Electric Flux, displacement vector, Columb law, Gradient, Divergence, Curl, Gauss Theorem, Stokes theorem, Gauss law in dielectrics, Maxwell's equation: Integral & Differential form in free space, isotropic dielectric medium.

**Lasers:** Properties of lasers, types of lasers, derivation of Einstein A & B Coefficients, Working He-Ne and Ruby lasers.

**Fibre Optics:** Light guidance through optical fibre, types of fibre, numerical aperture, V-Number, Fibre dispersion (through ray theory in step index fibre), block diagram of fibre optic communication system.

**Quantum Mechanics:** Black body radiation, ultraviolet catastrophe, Crompton effect, plates theory of radiation, phase and group velocity, particle in a box, uncertainty principle, well-behaved wave equation, Schrodinger equation, application to particle in a box

**Optics:** Interference, division of amplitude & division of wave front, young's double slit experiment, thin film interference, Newton Ring Experiment. Diffraction: Difference between interference and diffraction, types of diffraction, single slit, double slit & n-slit diffraction, Resolving power of grating.

**Semiconductors:** Crystalline and Amorphous solids, Band theory of solids, mobility and carrier concentrations, properties of P-N junction, Energy bands, hall effect, VI characteristics of photodiode, zener diode and photovoltaic cell

**Nuclear Physics:** Nuclear composition, mass defect, binding energy, nuclear force, liquid drop model, elementary idea about nuclear fission and fusion.

**LABORATORY**

Experiments as suggested by the course coordinator.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

**REFERENCES**

*A Bezier, Concepts of Modern Physics, McGraw Hills*  
*Ghatak, Optics, McGraw Hills*

**COURSE OBJECTIVE:**

To provide students with a basic foundation in the fundamental concepts and knowledge base of modern biology and help students develop the skills that are integral to the process of various disciplines of biomedical sciences. This course provides a coherent framework for understanding basics of botany and zoology and prepares students for their upper-level subjects in the field of biomedical sciences.

**COURSE CONTENT:**

Theory:

Significance of basics of biology in biomedical science. Cell (Plant and animal): its structure, living and non-living inclusions, cell cycle and cell division, stages of mitosis, meiosis and their significance.

Elementary tissues of the human body: epithelial, connective, muscular and nervous tissues. Different types of plant tissues and their functions.

Morphology and histology of plant parts: root, stem, bark, wood, leaf, flower, fruit and seed. Modifications of roots and stems.

Physiology of plants: photosynthesis, respiration and transpiration.

Plant Taxonomy: Classification of plant kingdom. Study of the following families with special reference to medicinally important plants: apocynaceae, solanaceae, umbelliferae, labiatae, leguminosae, and liliaceae. Introduction to plant products of economic importance like plant drugs, dyes, fibers, spices, scents, beverages, resins.

Introduction to animal products of economic importance like animal biological products, honey, pearl, lac, silk, lather, etc.

Animal kingdom: Classification and its basis. Fundamentals of parasitology, general morphology and life history of internal parasites like plasmodium, taeniasolium (tapeworm). General structure and life history of insects like mosquito.

Basic study of the following systems of frog: Gastro Intestinal (Digestive enzymes), nervous, cardiovascular: genitourinary (glands and hormones), musculo-skeletal, respiratory systems.

Simple and compound microscopes used in biology. Origin and evolution of life: an outline. Fundamental laws of inheritance: Mendel's law. Molecular basis of inheritance – DNA, RNA, replication, transcription, genetic code and translation.

**COURSE OUTCOMES**

After completion of course, student should be able to:

- Understand the structures and functions of basic components of prokaryotic and eukaryotic cells.
- Understand the process of cell division in both somatic and germ cells.
- Understand general terminology of plant structures, morphology, internal anatomical features and families.
- Understand the economical importance of products of animals and plants.
- Understand formation of RNA, DNA, proteins and process of inheritance.
- Understand the organ systems of frog and human parasites.

**EVALUATION:** Evaluation will be continuous an integral part of the class as well through external assessment.

REFERENCES:

1. Dutta A.C., “*Botany for Degree students*”, 20th edition, Oxford university press publisher, 2006.
2. Vidyarthi R.D., Pandey P. N., “*A Text Book of Zoology*”, 1st edition, S Chand & Co. Pvt. Ltd. Publisher, 2006.
3. John E. Hall, Guyton & Hall: “*Textbook of Medical Physiology*”, 13th edition, WB Saunders Company, 2015.
4. Bhatia K.N., “*Truemans: Elementary Biology*”, Vol. II, 27th edition, Trueman book company-New Delhi, 2014.
5. Evans W. C., “*Trease and Evans Pharmacognosy*”, 16th edition, Saunders Ltd, 2009.
6. NaliniChandar, *Cell and Molecular Biology (Lippincott's Illustrated Reviews Series)*, Lippincott Williams & Wilkins publisher, 2012.

**COURSE OBJECTIVE:**

- To Familiarize Students with Surveying & its Various Divisions
- To Familiarize Students with Surveying Equipment & their Use
- To Familiarize Students with Computation of Areas & Volumes
- To Make the Students Capable of Dealing with Field Problems.

**COURSE CONTENT:**

**Introduction to Surveying:** Overview of Surveying, branches of surveying, principles of Surveying. Instruments Used for various measurements, Electronic Distance Measurement (EDM), Various EDM Instruments, Survey Maps, Conventional Symbols of Objects in the Map, Introduction to GIS, GPS, remote sensing and Digital Terrain Models (DTMS), applications of Remote Sensing.

**Linear Measurements:** Methods and terminologies of linear measurements, linear measurements using chain surveying, various operations in carrying out the chain surveying, various accessories for chaining, different type of chains and tapes, testing of chains. **Running Survey Lines:** Ranging, chaining and laying offsets, linear Measurements with chain on level ground /on sloping ground, **Errors in chaining:** Errors in Measurements with Incorrect Chain Length, Linear Measurements with Tape on Smooth Level or Sloping Ground / on Rough Ground, Tape Corrections, Setting out Right Angle on / From a Chain Line, Offsets – Limiting Length of Offset, Effect of Error in Laying out Direction, Effect of Error in Direction and Length Both. **Obstacles in Chain Survey:** Obstacles to Ranging, Obstacles to Chaining, Obstacles to Ranging and Chaining both. Numerical Problems.

**Angular measurements:** Overview and terminologies, Principle of Compass, Types of Compass, Compass Surveying, Traversing, Traversing with Chain and Compass, Designation of Bearings, Calculation of Included Angle from Bearings, Calculation of Bearing From Included Angles Errors and Precautions in Compass Surveying, Local attraction, Correction to Measured Bearing for Local Attraction, Adjustment of Closing Error. Magnetic Declination, Dip, Introduction Plane Table Surveying, Methods of Plane Table Surveying- Radiation Method and Intersection Method. Introduction to Theodolite. Numerical Problems.

**Vertical Measurements:** Overview and terminologies, Leveling Instruments-Different Types of Levels, Leveling Staff. Temporary and Permanent Adjustments of a Level. Leveling: Classification Based on Purpose of Leveling –Simple leveling, Differential or Compound or Continuous Leveling, Fly Leveling, Profile or Longitudinal Leveling, Cross-Section Leveling, Reciprocal Leveling, Precise Leveling, Booking and Reducing Levels. Height of Collimation or Height of Instruments Method. Rise and Fall Method, Errors and Precautions in leveling, Balancing Back Sight and Foresight, Error Due to Earth's Curvature and Refraction, Field Problems or Difficulties in Leveling, Numerical Problems.

**Measurement of Areas and Volumes:** Introduction, Areas: Areas from Field Measurements –Area Consisting of Irregular Boundary, Area from Plan –Graphical Method, Measurement of Area by Planimeter Errors & Precautions in Computation of Area. Volumes: Measurement of Volume. –from Cross Sections, from Spot Levels, from Contours, Area of Sections, Capacity of a Reservoir, Elevation - Capacity Curve, Earthwork, Mass Diagram. Numerical Problems.

**COURSE OUTCOMES**

After completion of course, student should be able to:

1. To Use Various Surveying Equipments
2. To Perform Survey in the Field and Tackle the Difficulties Faced.

**EVALUATION:** Evaluation will be continuous an integral part of the class, field as well through external assessment.

REFERENCES:

*Text Books*

1. *Surveying volume-1 3/e* by S.K. Duggal Publisher Tata McGraw Hill Education
2. *Surveying*, by Mimidas Saikia BM Das, MM Das Publisher PHI Learning
3. *Surveying & Leveling* by N. N. Basak Publisher MC.Graw Hill Education
4. *Plane Surveying* by A.M. Chandra New Age International Publisher
5. *Surveying Vol.1* by B.C. Punmia Publisher Luxmi Publications

*Reference Books*

1. *Fundamentals of Surveying* by S.K. Roy PHI Learning
2. *Remote Sensing and Image Interpretation 6/e* by Lillesand Kiefer Chipman Willey India Pvt ltd.
3. *Surveying 7/e* by A. Bannister, Stanley Raymond, Raymond Bakesr Publisher Pearson Education.

**AE110 INTRODUCTION TO AERONAUTICAL ENGINEERING**

**AE110**

**INTRODUCTION TO AERONAUTICAL ENGINEERING**

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**COURSE OBJECTIVE:**

This course introduces students to Aeronautical Engineering and its sub-domains. Students are expected to learn about scope, current and future trends, jobs, innovations & research opportunities in the field of Aeronautical Engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

**COURSE CONTENT:**

What is Engineering, Who are Aeronautical Engineers , Overview of Aeronautical Engineering its domains, scope and its utility in different areas; Specializations available with in Aeronautical Engineering and job opportunities in Automobile Engineering .

Basic definitions of terms related to Thermodynamics, First and Second law of Thermodynamics, Properties of Steam, Introduction to Boilers, Terminology of IC Engines, Two and Four Stroke Petrol and Diesel Cycle. Introduction to mechanical properties, basic manufacturing processes, pattern, type and its use in metal casting, Introduction of welding, brazing and soldering processes Case study on any topic from Manufacturing Engineering

Magazine Published by society of Aeronautical Engineering, Royal Aeronautical Society (RAeS), Society of Manufacturing Engineers (USA), Machinist Magazine, Technorama published by Institution of Engineers (India) and Manufacturing Today and any other magazine related to Aeronautical engineering.. Overview of Aeronautical Society of India (AeSI) , American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Society of Automotive Engineers, American Society of Mechanical Engineers (ASME); etc ; Emerging areas and new technologies in the field of Aeronautical Engineering

**COURSE OUTCOMES**

After successful completion of course, Students are expected to possess basic understanding and knowledge about the scope, current and future trends in mechanical engineering. The versatility of the mechanical engineering branch and career-opportunities in this field will enable the students to explore the new avenues in their future endeavours

**EVALUATION**

Evaluation will be continuous an integral part of the class only through internal assessment

**REFERENCES**

*Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning.*  
*Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis*  
*John D Anderson, Introduction to Flight (In SI Units), McGraw Hill Education*

**COURSE OBJECTIVE:**

This course introduces students to Automobile Engineering and its sub-domains. Students are expected to learn about scope, current and future trends, jobs, innovations & research opportunities in the field of Automobile Engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

**COURSE CONTENT:**

What is Engineering, Who are Automobile Engineers , Overview of Automobile & Mechanical Engineering, its domains, scope and its utility in different areas; Specializations available with in Automobile Engineering and job opportunities in Automobile Engineering.

Basic definitions of terms related to Thermodynamics, First and Second law of Thermodynamics, Properties of Steam, Introduction to Boilers, Terminology of IC Engines, Two and Four Stroke Petrol and Diesel Cycle. Introduction to mechanical properties, basic manufacturing processes, pattern, type and its use in metal casting, Introduction of welding, brazing and soldering processes Case study on any topic from Manufacturing Engineering.

Magazine Published by society of Automotive Engineering , Society of Manufacturing Engineers (USA), Machinist Magazine, Technorama published by Institution of Engineers (India) and Manufacturing Today and any other magazine related to mechanical engineering. Overview of American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Society of Automotive Engineers (SAE), United States Council for Automotive Research, American Society of Mechanical Engineers (ASME) etc; Emerging areas and new technologies in the field of Automobile Engineering like alternate automotive fuels, hybrid vehicles etc.

**COURSE OUTCOMES**

After successful completion of course, Students are expected to possess basic understanding and knowledge about the scope, current and future trends in mechanical engineering. The versatility of the mechanical engineering branch and career-opportunities in this field will enable the students to explore the new avenues in their future endeavours.

**EVALUATION**

Evaluation will be continuous an integral part of the class only through internal assessment

**REFERENCES**

*Jonathan Wickert, Kemper Lewis, An Introduction to Mechanical Engineering, CENGAGE Learning.*  
*Michael Clifford, Kathy Simmons, Philip Shipway, An Introduction to Mechanical Engineering: Part 1 and Part 2, Taylor and Francis*

**COURSE OBJECTIVE:**

This subject has been introduced for the undergraduate students to understand and develop the concepts of basic electrical engineering for all the undergraduate students of different branches of engineering.

**COURSE CONTENT:**

**D.C. Circuits:** Units and dimensions, Ohm's Law, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and their application for analysis of series and parallel resistive circuits excited by independent voltage sources, Power & Energy in such circuits. Mesh & nodal analysis, Star Delta circuits.

**1- phase AC Circuits:** Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity, Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series & parallel circuit

**3-phase AC Circuits:** Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections. Power in balanced & unbalanced three-phase system and their measurements

**Magnetic Circuits:** Basic definitions, magnetization characteristics of Ferro magnetic materials, self inductance and mutual inductance, energy in linear magnetic systems, coils connected in series, AC excitation in magnetic circuits, magnetic field produced by current carrying conductor, Force on a current carrying conductor. Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. single phase transformer- general construction, working principle, e.m.f. equation, open circuit and short circuit test

**Electrical Machines:** D.C. Motor & D.C. Generator, Three phase Induction motor and Synchronous Machines, their general construction, working principle, emf equation and applications. Types of losses occurring in electrical machines.

**COURSE OUTCOMES**

The final outcome of the subject will result into an enhancement in understanding the basic concepts of Core Electrical Engineering subjects. The topics covered under this subject will help to enhance the basic understanding of Electrical machines and power systems.

**EVALUATION**

Evaluation will be continuous an integral part of the class followed by final examination.

**REFERENCES**

1. D.P. Kothari & I.J. Nagrath, *Basic Electrical Engineering*, Tata McGraw Hill, latest edition.
2. S.N. Singh, *Basic Electrical Engineering*, P.H.I., 2013
3. Rajendra Prasad, *Fundamentals of Electrical Engineering*, Prentice Hall, 2014
4. M.S. Sukhija, T. K. Nagsarkar, *Basic Electrical and electronics engineering*, Oxford University press, 2012
5. C.L. Wadhwa, *Basic Electrical Engineering*. New Age International.
6. Bharti Dwivedi, *Fundamentals of Electrical Engineering*, Wilkey India, 2013
7. Sanjeev Sharma, *Basic Electrical Engineering*, I.K. International

**COURSE OBJECTIVE:**

This subject has been introduced for the undergraduate students of B.E. Electrical Engineering as an introductory minor course giving a broad spectrum of the prevalent technologies, carrier opportunities and prospects in the area of academics, industries and research and development in leading organizations.

**COURSE CONTENT:**

An overview of Electrical Engineering, Generation, Transmission and Distribution, Distributed generation, National Power Grids, Smart Grid

Various electrical equipments viz Transformer, Induction motor, synchronous machine, Circuit Breakers etc, Relays, substation components, Product specification, application

Leading manufacturers of Electrical equipments and components, Electrical Engineering research organization, PSUs and utilities

General Introduction to Power Electronics, Power System, Electrical Machines, Control System, Automation

Role of Electrical Engineer in Industry, R&D, Electrical Utilities, Placement scenario, future trends

**COURSE OUTCOMES:**

The final outcome of the subject will result into an enhancement in understanding vast spectrum of opportunities and applications of electrical engineering for an incumbent undergraduate student. Latest trends and technologies in the area of renewable energy, smart grid and industrial control will be the key outcome of this subject.

**EVALUATION:**

Evaluation will be continuous an integral part of the class only through internal assessment

**REFERENCES:**

1. *D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.*
2. *M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012*

**COURSE CONTENT:**

**Basic Concept:** Data Structure and algorithm preliminaries: Definitions; Data types, Time and Space analysis of Algorithms; Time and space trade-off, Pointers and dynamic memory allocation; Recursion.

**Arrays and Structure:** Concepts of Linear Search, Binary Search, Evaluation of Polynomial, Polynomial representation, Polynomial Addition, Structures: Internal representation of structure, Self-referential structure, Array: Definitions of Arrays and Lists, Strings, Row/Column major representation of Arrays.

**Stack and Queues:** Introduction to Stack, Static and Dynamic Representation, Operation, Application of Stack, Evaluation of Expression, postfix expression, Infix, prefix, Queue, Static and Dynamic Representation, Operation, Priority Queue, Circular Queue.

**Linked List and Trees:** Introduction to Linked List: Singly linked list, circular linked list, doubly linked list, operations on linked list, Introduction to Tree: Definition, Terminology, Generalised tree representation, Binary tree - definitions and properties, Representation, Binary Tree Traversal In-order, Pre-order, Post-order, Introduction to Binary Search Tree.

**Graphs; Searching & Sorting:** Introduction to Graphs: Representation, Adjacency Matrix and List, Indegree, out degree of Graph, Graphs Operation, DFS & BFS, Spanning Tree, Shortest path. Searching and Sorting Methods: Various Searching and Sorting algorithms with complexity analysis.

**EVALUATION**

Evaluation will be continuous an integral part of the class followed by final examination.

**REFERENCES**

*E Balagurusamy, Data Structures Using C, Tata McGraw Hill Education*

*Achuthsankar S. Nair & T. Mahalekshmi, Data Structures in C, PHI*

*R. Venkatesan & S. Lovelyn Rose, Data Structures, Wiley India*

*Rajesh K. Shukla, Data Structures Using C & C++, Wiley India*

*Langsam, Augenstein & Tenenbaum, Data Structures Using C & C++, Pearson*

*Dharmender Singh Kushwaha & Arun Kumar Mishra Data Structures: A Programming Approach with C, PHI*

*Tenebaum, Langsam & Augenstein, Data Structures Using C, Pearson*

**COURSE OBJECTIVE:**

This course introduces students to mining engineering and its sub-domains. Students are expected to learn about scope, current and future trends in mining industry, jobs, innovations & research opportunities in the field of mining engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

**COURSE CONTENT:**

**Introduction to Mining:** Mining contribution to civilization, mining technology, types of mining, stages in the life of mine, economics of mineral industries, economic analysis of a mineral commodity, the challenges and successes of the mining industry

**Mining and its consequences:** Government regulations applied to mining, Health and Safety issues in Mining, Environmental Responsibilities

**Stages of Mining:** General exploration methods, mining methods, drilling and other rock penetration methods, types of explosives, mining equipment selection, Novel methods and advancements in mining technology, Introduction to Mining Seismology, Energy conservation in mining & mineral industries.

*Overview of Magazines, Journals & Societies active in the field of mining - The Indian Mining & Engineering Journal (IME), Mining Engineers' Association of India (MEAI), The Society for Mining, Metallurgy, and Exploration, Inc. (SME).*

**COURSE OUTCOMES**

After successful completion of course, Students are expected to possess an in-depth understanding and knowledge about the scope, current and future trends in mining industry, elementary terminologies, learning resources and career-opportunities in the field of mining engineering and its allied domains.

**EVALUATION**

Evaluation will be continuous an integral part of the class only through internal assessment

**REFERENCES**

*Hartmann, Introductory Mining Engineering, Wiley India*

**COURSE OBJECTIVE:**

This course introduces students to fire technology and its sub-domains. Students are expected to learn about scope, current and future trends in fire industry, jobs, innovations & research opportunities in the field of mining engineering. Course content will be covered through lectures, assignments, case-studies, presentations, documentaries and field visits.

**COURSE CONTENT:**

**Introduction to Fire Technology:** Chemistry of Fire, Classification of Fire, Principles of Fire Spread, Explosion, First-aid Fire Fighting Equipment, Fire Prevention, Codes, Ordinances and Regulations for Fire Protection, Fire Protection Systems and Equipments, legal and financial consequences of failure to manage fire and safety, Role of Insurance Industry, Fire Technology Career Opportunities, Fire Safety Challenges in India.

**Causes & Prevention of Fire:** Accidental Fires, Prevention of Fire, classification of fire extinguishers, water as an extinguishant – its merits, demerits and modification, Fire investigations and case studies of different fire incidents in India and abroad.

**Fire Protection in Buildings:** Graphic Symbols for fire Protection Plan, Fire Protection – Safety Signs, Legislative requirements for fire protection, preventive and protective methods against fire in a building design, Means of escape.

*Overview of Magazines, Journals & Societies active in the field of Fire Technology - Fire Safety Journal - Elsevier, Society of Fire Protection Engineers (SFPE).*

**COURSE OUTCOMES**

After successful completion of course, Students are expected to possess an in-depth understanding and knowledge about the scope, current and future trends in the fire technology, elementary terminologies, learning resources and career-opportunities in the field of fire technology.

**EVALUATION**

Evaluation will be continuous an integral part of the class only through internal assessment

**REFERENCES**

1. *HMSO Fire Manuals No.1 – No.12*
2. *Equipment IS Codes.*
3. *Fire Protection Manual By TAC*
4. *Fire Protection literature by Loss Prevention Association.*
5. *Handbook on Building Fire Codes, G.B. Memon, IIT Kanpur*

### COURSE OBJECTIVE:

1. To Familiarize Students with Various Branches of Civil Engineering
2. To Familiarize Students With Civil Engineering Materials
3. To Familiarize Students With Building Construction
4. To Familiarize Students With Surveying
5. To Familiarize Students With Disaster Management

### COURSE CONTENT:

**Introduction:** Scope of Civil Engineering, Necessity of Civil Engineering, History of Civil Engineering, Brief Introduction of Branches of Civil Engineering.

**Properties, Uses and of Tests of Construction Materials:** Cement, Coarse Aggregate, Fine Aggregate, Water, Bricks, Stone, Steel, Plastic, Cement Mortar, Cement Concrete, Reinforced Cement Concrete, Timber, Paint, Distemper, Lime.

**Building Construction:** Types of Buildings, Requirements of Good Building, and Components of a Building. Bricks Masonry, Stone Masonry, Doors, Windows, Staircases, Lifts & Escalators, Floors, Roofs.

**Surveying:** Types of Surveying, Linear Measurements, Vertical Measurements & Angular Measurements- General Information.

**Disaster Management:** Types of Disaster, Disaster Resistant Buildings, Disaster Mitigation & Management.

### LABORATORY

Experiments as suggested by the course coordinator.

### COURSE OUTCOMES

1. Student would have General Idea of Various Branches of Civil Engineering
2. Students would be Acquainted with Construction Materials
3. Student would have Knowledge of Various Types of Surveying and Survey Equipments
4. Students would come to Know about Disaster Mitigation and Management

### EVALUATION

Evaluation will be continuous an integral part of the class followed by final examination.

### REFERENCES

1. *Satheesh Gopi , Basic Civil Engineering, Pearson Education.*
2. *M S Palanichamy, Basic Civil Engineering, McGraw Hill Education.*
3. *Mimi Das Saikia, Bhargab Mohan Das, Madan Mohan Das , Elements of Civil Engineering, PHI Learning Private Limited*

### COURSE OBJECTIVE:

To Introduce:

- Course Structure & Scope of the branch
- The basic concepts in Computer Science & Engineering
- The different styles of programming
- Types & important features of programming languages

### COURSE CONTENT:

CBCS Guidance/ Counselling / Advices, Complete course structure/scheme, Continuous Evaluation System. Relevance & Importance of each subject, Specialization Flow Diagram, Pre-requisite Flow Diagram, Scope of the Branch and Future Avenues.

Review of Computer Engineering Fundamentals: Definition, Evolution, Classification, Number System, Organization i.e. CPU, register, Bus Architecture, Instruction Set, Memory & Storage Systems, I/O Devices & Application Software

Computer Science & Engineering Application in: Data Processing, Information Systems, Communication, Interworking, World Wide Web, e-Business, Bio-Informatics, Health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc, Defence.

Introduction to flowchart, Algorithm, Categories of Programming Languages, Program Design, What are data structures, Introduction to Programming, Security Threats: Viruses, Worms, Malware, Trojans, Spyware, and anti-spyware software, firewall, internet fraud.

Overview and idea about good computer magazines, Major Computer Science & Engineering Journals, Case Studies/ Success Stories of Computer Engineers, Professional Societies and associations, Computing Ethics & Good Practices.

### COURSE OUTCOMES

After successful completion of course, students will be able to:

- Know course structure & scope of the branch
- Know the basic concepts in Computer Science & Engineering
- Compare different styles of programming languages
- Will start writing algorithm for problems

### EVALUATION

Evaluation will be continuous an integral part of the class only through internal assessment

### TEXT/ REFERENCES:

*Subhasis Banerjee, S. Arun Kumar, D. Dubhashi, Introduction to Computer Science, Peter Norton, Computing Fundamentals, McGraw Hill India*  
*Peter Norton, Introduction to Computers, TMH*  
*Silakari & Rajesh K Shukla, Basic Computer Engineering, Wiley India*  
*Kenneth Hoganson, Concepts in Computing, Jones & Bartlett*  
*RJ Dromey, How to solve it by computer, Prentice Hall India Series, 2007*

### COURSE CONTENT:

**Computer:** Definition, classification, Organization i.e. CPU, register, Bus Architecture, Instruction Set, Memory & Storage Systems, I/O Devices, and System and Application Software, Computer Application in e-Business, Bio-Informatics, Health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.

**Operating System:** Definition, Function, Types, Management of File, Process & Memory.

Introduction to MS Word, MS Power Point, MS Excel

Introduction to algorithm, Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS Object Oriented Programming, Introduction to C++: Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and Control Structures, I/O Operations, Array, Functions.

Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual Functions, Introduction to Data Structures

Computer Networking: Introduction, Goals, ISO-OSI Model, Functions of different layers. Internet working concepts, Devices, TCP/IP Model, Introduction to Internet, World Wide Web, E-Commerce.

Computer Security Basics: Introduction to Viruses, Worms, Malware, Trojans, Spyware, and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Email Spoofing, Denial of Services (DoS), Cyber Stalking, Logic Bombs, Hacking, Spamming, Cyber Defamation, Pharming Security Measures Firewall, Computer Ethics & Good Practices, Introduction to Cyber Laws about internet fraud, Good Computer Security Habits.

Database Management System: Introduction, File Oriented Approach and Database approach, Data Models, Architecture of Database System, Data Independence, Data Dictionary, DBA, Primary Key, Data Definition Language and Manipulation Languages.

Cloud Computing: Definition, Cloud Infrastructure, Cloud Segments or service delivery models (IaaS, PaaS, SaaS), Cloud deployment models/ types of cloud (public, private, community and hybrid cloud), Pros and Cons of Cloud Computing.

### LIST OF EXPERIMENTS:

1. Study and Practice of Internal & External DOS Commands
2. Study and Practice of Basic LINUX Commands – ls, cp, mv, rm, chmod, kill, ps etc.
3. Study and Practice of MS Windows – Folder Related Operations, My Computer, Window-Explorer, Control Panel
4. Creation and Editing of Text Files using MS Office (MS Word)
5. Creation and Operating of Spreadsheet using MS Excel
6. Creation and Editing Power Point Slides using MS Power Point
7. Creation and Manipulation of Database Tables using SQL in MS Access
8. WAP to illustrate Arithmetic Expressions
9. WAP to illustrate Arrays
10. WAP to illustrate Functions
11. WAP to illustrate constructor & Destructor
12. WAP to illustrate Objects & Classes
13. WAP to illustrate Operator Overloading
14. WAP to illustrate Function Overloading

## RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

15. WAP to illustrate Derived Classes & Inheritance
16. WAP to insert and Delete end Element from the stack
17. WAP to insert and delete end element from the Queue

### EVALUATION

Evaluation will be continuous an integral part of the class followed by an external examination.

### REFERENCES

*E Balaguruswamy, Fundamentals of Computers, TMH*  
*Silakari and Shukla, Basic Computer Engineering, Wiley India*  
*V Rajaraman, Fundamentals of Computes, PHI*  
*Ajoy Kumar Ray & Tinku Acharya, Information Technology Principles and Application*  
*Peter Norton, Introduction to Copmputers, TMH*

### COURSE OBJECTIVE:

- To familiarize the students with the evolution and basics of Electronics & Instrumentation Engineering.
- To introduce the various sub-domains of Electronics & Instrumentation Engineering

### COURSE CONTENT:

#### INTRODUCTION

General overview of Electronics Engineering and its sub domains, History of Electronics Engineering, Applications of electronics, Electronic components, Very Large Scale Integration (VLSI)

#### STATISTICAL FUNDAMENTALS:

Basic characteristics of measuring devices, types of errors and their statistical analysis, accuracy, precision and ratings of instruments, fundamental, derived and international systems of units and their conversion. Calibration, Primary and Secondary Standards.

#### INSTRUMENTATION FUNDAMENTALS

Generalized Configuration & Fundamental Description of Measuring Instruments, Principle of working of various instruments used to measure basic electronic parameters, elements of basic instrumentation systems.

#### SCOPE & OPPORTUNITIES

Overview of Electronics Instruments Industries in India and Abroad; Current status, contribution to GDP, export and growth potential, organizational structure, manpower requirement, and future prospects. Employment opportunities, Nature of Job, risks and challenges involved, Exploration of career and professional development opportunities, Latest trends in VLSI Design.

#### INNOVATION AND RESEARCH

Overview of notable National Research Organizations/ Authorities/ Societies/ Forums such as etc. Emerging areas and new technologies in the field of Electronics & Instrumentation Engineering, Overview of Peer Reviewed Journals, and Magazines Published in the field of Electronics & Instrumentation Engineering, Systematic Ways of Research and Objectives of Research.

### COURSE OUTCOMES

After successful completion of course, students are expected to

1. To understand the fundamentals of electronics & instrumentation.
2. To become aware of the scope, opportunities and trends in the various sub-domains of electronics & instrumentation.

### EVALUATION

Evaluation will be continuous an integral part of the class only through internal assessment

### REFERENCES:

*Bernard M. Oliver, J.M. Cage, Electronic Measurement and Instrumentation, McGraw Hill*  
*Albert D Helfrick, William D Cooper, Modern Electronics Instrumentation and Measurement Techniques, Pearson Ed*  
*All other course materials will be provided by the instructor*

**COURSE OBJECTIVE:**

1. To understand the construction, identification, characteristics, specifications, merits, limitations and applications of electronic components and materials
2. To understand communication, audio and video communication, and microwave communication
3. To fill the gap between learning and application
4. To explore varied career options

**COURSE CONTENT:**

**INTRODUCTION:** What is electronics, An introduction to Electronic devices & circuits, Analog and digital electronics, Analog communication, Digital communication, Microwave engineering, Micro processor & controllers, Antenna, Signals & systems.

**SCOPE AND APPLICATIONS:** Wireless communication, Satellite Communication, Internet Telephony, Nanotechnology, Teleconferencing, Embedded System, Wireless Sensor Networks, Optical Computing, Electrocardiograph, Display Technology, Advanced Optical Networks, Brain Computer Interfaces, Thin Film Technology, Global positioning system, Fiber Optics, Micro electro mechanical systems, Robotics, Radar, Speaker Recognition, Microwave Communication, Earthquake Monitoring, Remote Sensing, Direct to Home TV systems, Wireless Communication (mobile phones, geographical navigation, satellite communication, Wi-Fi etc.)

**SOME OF THE GOVT. SECTOR / PRIVATE SECTOR ELECTRONICS LABS/DIVISION/COMPANIES:** CSIR LABS, CSIO, DRDO, BSNL, BEL, BHEL, C-DAC, DOORDARSHAN, ISRO, TBRL, IIT'S, Environment Monitoring Divisions PANASONIC, SAMSUNG, SONY, PHILIPS, TOSHIBA, SANSUI, VIDEOCON, ONIDA, HAIER, LG ELECTRONICS, PIONEER, LLYOD HITACHI, APPLE, WIPRO, ELICO, HP

**TELECOM COMPANIES:** Top companies of VLSI, Fabrication units in India and abroad

**CAREER OPTIONS:** Telecommunication, Software Development, Consumer Electronics, Semiconductor, Embedded Systems etc.

Product Based Company – Building their own product and selling it in market,

Service Based Company – Building product, application or part of them, for other companies and their clients

Telecom equipment R&D, EDA Company

Electronic Exchanges, Department of Telecommunications, BSNL, Railways, Electricity Board, Medical equipments manufacturing

**COURSE OUTCOMES**

To prepare the students according to the requirements of industry for highly skilled engineers and contribute to the next generation technology by their innovation.

**EVALUATION**

Evaluation will be continuous an integral part of the class.

**REFERENCES**

*Study material provided by the instructor*

**COURSE OBJECTIVE:**

1. Develop comprehensive understanding of Textile Industry its products and its impact in a global scenario
2. Develop comprehensive understanding in the area of textile technology, which includes fibre, yarn and fabric through independent study.
3. To explore varied career options

**COURSE CONTENT:**

**TEXTILE INDUSTRY:** Sectors of textile industry viz. organized mill sector, decentralized small scale sector. Sectors based on technology: Handloom, Powerloom, Garment, Cotton, Silk, Wool, Jute and Synthetic Fibres. Indian cotton: Production, quality and global competition. Changing scenario of Indian Textile Industry in the wake of WTO Agreement. Strengths and weaknesses of the Indian Textile Industry in the global scenario. Research and technology support to the Indian Textile Industry.

**TEXTILE TECHNOLOGY:** Classification of textile fibres according to their nature and origin, b) essential and desirable properties of textile fibres, c) staple fibre and continuous filaments, d) comparison of natural and manmade fibres. Introduction of yarn, fabrics. Sequence of operations for conversion of natural and manmade fibres into finished fabrics. Fabric construction technology: knitting, weaving and production of non woven. Fabric to Garment. Importance of Design. Quality aspects of yarns, fabrics and garments. Processing and finishing of fabrics and garments.

**COURSE OUTCOMES**

Upon completion of this course the student shall be able to

1. Understand the influence of textile industry on Indian and global economy
2. Understand the fundamentals of textile fibre classifications
3. Make better career decisions

**EVALUATION**

Evaluation will be continuous an integral part of the class.

**REFERENCES**

*Corbmann, "Textiles Fibre to Fabric", New York McGraw Hill*  
*Study material provided by the instructor*

**COURSE OBJECTIVE:**

The objective of this foundational course is to develop general familiarity and understanding with the following areas in chemistry: inorganic, organic, physical chemistry, electrochemistry, photochemistry and Thermochemistry. The course also intended to make students work effectively and safely in the laboratory working environment. Last portion of curriculum addresses critical thinking and numerically analyzing the chemical problems.

**COURSE CONTENT:**

**Molecular Structure & Bonding:** VSEPR Model, Valance-Bond Theory, Molecular Orbital Theory, Molecular Orbital of Polyatomic Molecules.

**Electrochemistry:** Arrhenius theory of electrolytic dissociation, Transport Number, Kohlrausch's Law, Solubility Product, Redox Reaction, Electrochemical & Concentration Cells.

**Chemical & Phase Equilibria:** Phase Diagram for single component system (Water), Phase diagram for Binary Eutectic System (Copper-Silver), Corrosion of metals in acids, Corrosion by Oxygen, Corrosion by Metal Contact.

**Reaction Dynamics:** Order, Molecularity, Rate Law, Methods of determining order of reaction (1<sup>st</sup> & 2<sup>nd</sup> Order).

**Polymers & Polymerization:** Monomers, Polymers, their classification, thermoplastics & thermosetting with examples, Bio-Polymerization, Bio-Degradable Polymerization, Preparation, Properties & Technical Applications of PVC, PVA, Teflon, Nylon6, & Nylon6:6, Polyester, Phenol-Formaldehyde, Urea-Formaldehyde, Natural & Synthetic Rubber, Vulcanization of Rubber.

**Photochemistry:** Photo-excitation of organic molecules, Jablonski Diagram, Laws of Photochemistry and quantum yield, some examples of photochemical reactions, chemistry of vision and other applications of photochemistry.

**Thermochemistry:** Fundamental concept of first law, work, heat, energy and enthalpies, relation between  $C_v$  &  $C_p$ . Second Law: Entropy, Free Energy, (The Helmholtz and Gibbs) and chemical potential.

Numerical problems based on water analysis and water softening process. Determination of hardness by complexometry, Alkalinity and its determination and their relevant numerical problems, testing of lubricating oils, viscosity and viscosity index, flash & fire point, cloud & pour point, Aniline Point, Carbon Residue, Steam-emulsion number, Neutralization number, Saponification number.

**LABORATORY**

Experiments as suggested by the course coordinator.

**COURSE OUTCOMES**

Student after successful completion of course must possess skills to think critically and analyze chemical problems. They must also feel confident to work in teams as well as independently. Students are also expected to learn solving chemistry problems with an engineering purview. Laboratory work is intended for students to learn conducting experiments, and analyze experimental data.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

REFERENCES

*Lee, J. D, Author, Concise Inorganic Chemistry, Oxford University Press*

*Alberty, R. A., Physical Chemistry, John Wiley and Sons*

*N. Krishnamurthy, P. Vallinayagam, Engineering Chemistry, PHI Learning Pvt. Ltd.*

*Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology, Tata McGraw Hill.*

**COURSE OBJECTIVE:**

The objective of this foundational course is to introduce students to the basic concepts of chemistry used in Engineering & Technology. This will develop and inculcate knowledge of chemistry in engineering students.

**COURSE CONTENT:**

**Basic Concepts of Chemistry:** Homogenous and heterogeneous catalysis, colloids, salt hydrolysis, stereoisomerism & configuration.

**Organic Reaction Mechanism:** Bonding in organic molecules, homolytic & heterolytic fission, electronic displacement effects in organic molecules, reactive intermediates; addition, substitution, elimination & rearrangement reactions.

**Chemical Fuels:** Definitions and classification of fuels, criteria of selection of fuels, calorific values and their determination by Bomb calorimeter, Proximate and ultimate analysis of coal and their significance, carbonization of coal, liquid fuels and their advantages, knocking, octane number, cetane number, Introductory idea of Cracking and its types, Advantages of Gaseous fuels, Numerical problems based on combustion.

**Metals and Alloys:** Physical Properties of metals, metallurgy, cast iron, wrought iron & steel, copper, nickel, Aluminium alloys & their application.

**Protective Coatings:** Introductory idea about metallic, non metallic & Organic coatings; Paints, Varnishes, Enamels & Lacquers.

**LABORATORY**

Experiments as suggested by the course coordinator.

**COURSE OUTCOMES**

After successful completion of course, student will have an understanding of basic concepts of chemistry which are useful for engineers. Student will have knowledge of reaction mechanisms, chemical fuels, metals, alloys, & protective coatings.

**EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment. Laboratory assessment will be based on assignments, presentations, and interview of each candidate.

**REFERENCES**

*JC Kuriacose & J. Rajaram, Chemistry in Engineering & Technology. Vol –I & Vol-II., Tata McGraw Hill*  
*Sawyer, McCarty and Parkin, Chemistry for Environmental Engineering, McGraw Hill, International*  
*Jain & Jain, Engineering Chemistry, Dhanpat Rai Publications New Delhi*  
*Shashi Chawla, Engineering Chemistry, Dhapat Rai Publications New Delhi*  
*Arun Bahl & BS Bahl, A Text Book of Organic Chemistry, S Chand Publications*  
*Puri & Sharma, Physical Chemistry, S Chand Publications*  
*Subhja Ramesh & Others, Engineering Chemistry, Wiley India*  
*CV Agrawal, CP Murthy, A Naidu. Chemistry of Engineering Materials, BS Publications, Hyderabad*  
*SS Dara, AK Singh, A Text book of Engineering Chemistry, S Chand Publications, New Delhi*

# Rajiv Gandhi Proudhgyiki Vishwavidyalaya, Bhopal

Semester VI

Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Civil Engineering)

Subject wise distribution of marks and corresponding credits

**Scheme of Examination w.e.f. July-2017 Academic Session-2017-18**

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted							Hours / week.			Total Credits	Remarks
			Theory			Practical			Total Marks	L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work	Assignment/ Quiz/Term paper						
1	<b>CE-6001</b>	Design of Hydraulic Structures	70	20	10	-	-	-	100	3	1	-	4	One credit refers to one hour teaching in theory, Tutorial and in practical.
2	<b>CE-6002</b>	Structural Design I (RCC)	70	20	10	30	10	10	150	3	1	2	6	
3	<b>CE-6003</b>	Geotechnical Engineering - I	70	20	10	30	10	10	150	3	1	2	6	
4	<b>CE-6004</b>	Highway Engineering	70	20	10	30	10	10	150	3	1	2	6	
5	<b>CE-6005</b>	Elective-II	70	20	10	-	-	-	100	3	1	-	4	
6	<b>CE-6006</b>	Design of Hydraulic Structures (Lab)	-	-	-	30	10	10	50	-	-	2	2	
7	<b>CE-6007</b>	Creativity and Entrepreneurship Development** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
8	<b>CE-6008</b>	Startup / Industrial Lectures ** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
			350	100	50	120	40	140	800	15	5	12	32	800

MST: Minimum of two mid semester tests to be conducted.

L: Lecture      T: Tutorial      P: Practical

\*\* OR any other subject as suggested by respective BOS

<b>Department Elective-II (Four Subjects)</b>	
S. No.	Subject Name
1	Advanced Water Resources Engineering
2	Computational Methods in Structural Engineering
3	Environmental Impact Assessment
4	IPR (Intellectual Property Rights)

## Rajiv Gandhi Proudhogiki Vishwavidyalaya, Bhopal

Semester VI

Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Computer science & Engineering)

Subject wise distribution of marks and corresponding credits

**Scheme of Examination w.e.f. July-2017 Academic Session-2017-18**

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted							Hours / week.			Total Credits	Remarks
			Theory			Practical			Total Marks	L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work	Assignment/ Quiz/Term paper						
1	<b>CS-6001</b>	Advanced Computer Architecture	70	20	10	-	-	-	100	3	1	-	4	One credit refers to one hour teaching in theory, Tutorial and in practical.
2	<b>CS-6002</b>	Principles of Programming Languages	70	20	10	30	10	10	150	3	1	2	6	
3	<b>CS-6003</b>	Software Engineering & Project Management	70	20	10	30	10	10	150	3	1	2	6	
4	<b>CS-6004</b>	Computer Networking	70	20	10	30	10	10	150	3	1	2	6	
5	<b>CS-6005</b>	Elective-II	70	20	10	-	-	-	100	3	1	-	4	
6	<b>CS-6006</b>	Minor Project	-	-	-	30	10	10	50	-	-	2	2	
7	<b>CS-6007</b>	Creativity and Entrepreneurship Development** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
8	<b>CS-6008</b>	Startup / Industrial Lectures ** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
			350	100	50	120	40	140	800	15	5	12	32	<b>Total Marks</b> 800

MST: Minimum of two mid semester tests to be conducted.

L: Lecture      T: Tutorial      P: Practical

\*\* As per University Template

<b>Department Elective-II (Four Subjects)</b>	
S. No.	Subject Name
1	Internet of Things
2	Mobile Application Development
3	IPR (Intellectual Property Rights)

## Rajiv Gandhi Proudhogiki Vishwavidyalaya, Bhopal

**Semester VI**

Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Electronics and Communication Engineering)

Subject wise distribution of marks and corresponding credits

**Scheme of Examination w.e.f. July-2017 Academic Session-2017-18**

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted							Hours / week.			Total Credits	Remarks
			Theory			Practical			Total Marks	L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work	Assignment /Quiz/Term paper						
1	<b>EC-6001</b>	Cellular mobile communication	70	20	10	-	-	-	100	3	1	-	4	One credit refers to one hour teaching in theory, Tutorial and in practical.
2	<b>EC-6002</b>	Digital signal Processing	70	20	10	30	10	10	150	3	1	2	6	
3	<b>EC-6003</b>	Antennas and wave Propagation	70	20	10	30	10	10	150	3	1	2	6	
4	<b>EC-6004</b>	VLSI circuits and systems	70	20	10	30	10	10	150	3	1	2	6	
5	<b>EC-6005</b>	Elective-II	70	20	10	-	-	-	100	3	1	-	4	
6	<b>EC-6006</b>	Workshop-II	-	-	-	30	10	10	50	-	-	2	2	
7	<b>EC-6007</b>	Creativity and Entrepreneurship Development** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
8	<b>EC-6008</b>	Startup / Industrial Lectures ** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
			350	100	50	120	40	140	800	15	5	12	32	<b>Total Marks</b> 800

MST: Minimum of two mid semester tests to be conducted.

L: Lecture      T: Tutorial      P: Practical

\*\* OR any other subject as suggested by the respective BOS

<b>Department Elective-I (Four Subjects)</b>	
S. No.	Subject Name
1	<b>Nano Electronics</b>
2	<b>RFID</b>
3	<b>Statistical signal Processing</b>
4	<b>IPR (Intellectual Property Rights)</b>

**Semester VI****Rajiv Gandhi Proudhyogiki Vishwavidyalaya, Bhopal**

Credit Based Grading System (CBGS) w.e.f. July-2017

Scheme of Examination

Bachelor of Engineering B.E. (Information Technology)

Subject wise distribution of marks and corresponding credits**Scheme of Examination w.e.f. July-2017, Academic Session-2017-18**

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Total Marks	Hours / week.			Total Credits	Remarks
			Theory			Practical				L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work	Assignment/ Quiz/Term paper						
1	<b>IT -6001</b>	Internet Technology and Network Management	70	20	10	-	-	-	100	3	1	-	4	One credit refers to one hour teaching in theory, Tutorial and in practical.
2	<b>IT -6002</b>	Software Engineering	70	20	10	30	10	10	150	3	1	2	6	
3	<b>IT -6003</b>	Computer Graphics and Multimedia	70	20	10	30	10	10	150	3	1	2	6	
4	<b>IT -6004</b>	Compiler Design	70	20	10	30	10	10	150	3	1	2	6	
5	<b>IT -6005</b>	Elective-II	70	20	10	-	-	-	100	3	1	-	4	
6	<b>IT -6006</b>	Minor Project	-	-	-	30	10	10	50	-	-	2	2	
7	<b>IT -6007</b>	Creativity and Entrepreneurship Development (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
8	<b>IT -6008</b>	Startup / Industrial Lectures (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
			350	100	50	120	40	140	800	15	5	12	32	800

MST: Minimum of two mid semester tests to be conducted.

L: Lecture

T: Tutorial

P: Practical

\*\* OR any other subject as suggested by respective BOS

<b>Department Elective-II (Four Subjects)</b>	
S. No.	Subject Name
1	Digital Signal and Processing
2	Distributed System
3	Web Technology
4	IPR (Intellectual Property Rights)

**Rajiv Gandhi Proudhogiki Vishwavidyalaya, Bhopal**

**Semester VI**

Credit Based Grading System (CBGS) w.e.f. July 2017

Scheme of Examination

Bachelor of Engineering B.E. (Mechanical Engineering)

Subject wise distribution of marks and corresponding credits

**Scheme of Examination w.e.f. July-2017 Academic Session-2017-18**

S. No.	Subject Code	Subject Name & Title	Maximum Marks Allotted							Hours / week.			Total Credits	Remarks
			Theory			Practical			Total Marks	L	T	P		
			End Sem	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work	Assignment/ Quiz/Term paper						
1	<b>ME-6001</b>	Industrial Engineering	70	20	10	-	-	-	100	3	1	-	4	One credit refers to one hour teaching in theory, Tutorial and in practical.
2	<b>ME-6002</b>	Thermal Engineering and gas dynamics	70	20	10	30	10	10	150	3	1	2	6	
3	<b>ME-6003</b>	Heat & Mass Transfer	70	20	10	30	10	10	150	3	1	2	6	
4	<b>ME-6004</b>	Metal Cutting & machine Tools	70	20	10	30	10	10	150	3	1	2	6	
5	<b>ME-6005</b>	Elective-II	70	20	10	-	-	-	100	3	1	-	4	
6	<b>ME-6006</b>	CFD/FEM/Scilab	-	-	-	30	10	10	50	-	-	2	2	
7	<b>ME-6007</b>	Creativity and Entrepreneurship Development** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
8	<b>ME-6008</b>	Startup / Industrial Lectures ** (Internal Assessment)	-	-	-	-	-	50	50	-	-	2	2	
			350	100	50	120	40	140	800	15	5	12	32	800

MST: Minimum of two mid semester tests to be conducted.

L: Lecture      T: Tutorial      P: Practical

\*\* OR any other subject as suggested by respective BOS

<b>Department Elective-II (Four Subjects)</b>	
<b>S. No.</b>	<b>Subject Name</b>
<b>1</b>	<b>Total Quality Management &amp; Statistical Quality Control</b>
<b>2</b>	<b>Finite Element Method</b>
<b>3</b>	<b>Power Plant Engineering</b>
<b>4</b>	<b>IPR (Intellectual Property Rights)</b>