SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR - 440013

An Autonomous College affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI
2018 - 2022

B. E. (COMPUTER SCIENCE & ENGINEERING)
About the Department:
The Department of Computer Science & Engineering was established in 2002, is well-equipped with state-of-the-art infrastructure.
The state of art infrastructure includes latest configuration desktops organized in four different laboratories. There are total 170 desktops with internet facility and inter-connected by a 24 hours server and CISCO router.
Computer laboratories have IBM and WIPRO servers and uses software of industry standard like Rational Rose, Oracle, DB2 AIX, and MSDN subscription for Microsoft products.
The Department is an authorized training center for Oracle Certification where students pursued certification like Oracle Certified Associate (OCA) and Oracle Certified Professional (OCP). The process of signing MOU for SUN-Java Technologies is in progress.
The Department has a distinction of consistently achieving above 95% results in the final year. Students are encouraged to appear in GATE, CAT, GRE and other competitive examinations which have resulted in increasing number of students clearing these exams. Mr. Anshul Agarwal has secured All India Rank 79 in GATE 2014 examination with GATE score of 886.

Department Vision:
To continually improve the education environment, in order to develop graduates with strong academic and technical background needed to achieve distinction in the discipline. The excellence is expected in various domains like workforce, higher studies or lifelong learning.
To strengthen links between industry through partnership and collaborative development works.

Department Mission:
To develop strong foundation of theory and practices of computer science amongst the students to enable them to develop into knowledgeable, responsible professionals, lifelong learners and implement the latest computing technologies for the betterment of the society.

Program Education Objectives:
I. To prepare graduates to apply the broad set of techniques, tools, and skills from science, mathematics and engineering required to solve problems in Computer Science and Engineering.
The field of Computer Science & Engineering is a fast evolving field and caters to multiple disciplines. The focus is to imbibe necessary skill set amongst the students and develop competencies to solve basic computer science & engineering problem.
II. To prepare graduates to address practices in computer science and engineering using software development life cycle principles.
The department aims to develop good analytical and designing skills amongst students, while emphasizing on theoretical and practical aspects of computer science.
III. To provide adequate training & opportunities to work as teams in multidisciplinary projects.
The department aims at encouraging team spirit through projects which are multidisciplinary in nature.
IV. To prepare the graduates to exhibit professionalism, communication skills, ethical attitude, and practice their profession with high regard to legal and ethical responsibilities.
The department recognizes the need for effective communication in students and strives to enhance this aspect. The department feels that apart from curricular studies, it is necessary to impart good moral values in the students so that they are aware of their social responsibilities.
V. To prepare graduates for engaging in life-long learning, such as post graduate study & certification courses.
The department encourages the students for higher studies and certification courses to keep track with the pace of technology.

Programme Outcomes (POs):
1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs):
1. Foundation of Computer System: Ability to understand fundamental concepts of computer science & engineering, operating system, networking & data organization systems, hardware & software aspects of computing.
2. Software development Ability: Ability to understand the software development life cycle. Possess professional skills and knowledge of software design process. Familiarity and algorithmic competence with a broad range of programming languages and open source platforms.
3. Research Ability: Ability to apply knowledge base to identify research gaps in various domains, model real world problems, solve computational tasks, to provide solution for betterment of society with innovative ideas.
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<tr>
<th>Sr. No.</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours/ Week L T P</th>
<th>Credits</th>
<th>Maximum Marks</th>
<th>ESE Duration (Hrs.)</th>
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<td>Fundamentals of Digital Logic and Computer Architecture</td>
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### Scheme of Teaching & Examination of Bachelor of Engineering

#### V Semester B.E. (Computer Science Engineering)

<table>
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<tr>
<th>Sr. No.</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours/ Week</th>
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### Course Code
- Elective - I
  - CST355-1: Computer Graphics
  - CST355-2: Embedded Systems
  - CST355-3: Information Theory & Coding
  - CST355-4: Design Pattern

#### VI Semester B.E. (Computer Science Engineering)

<table>
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<th>Sr. No.</th>
<th>Course Code</th>
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<td>CST456-1</td>
<td>Neural Network &amp; Deep Learning</td>
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<td>Information Retrieval</td>
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<td>Robotics : Perception &amp; Estimation</td>
<td>CST457-2</td>
<td>Natural Language Processing</td>
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<td>Multi Agent Intelligent Systems</td>
<td>CST457-3</td>
<td>Data Warehousing for Business Intelligence</td>
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<td>CST456-4</td>
<td>Cryptography &amp; Network Security</td>
<td>CST457-4</td>
<td>Internet of Things</td>
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Open Elective - I  
1. Java Programming and UI design concepts  
2. Design Thinking for innovation

Open Elective - II  
Python and Data Analysis

Open Elective - III  
Recent trends in Computing

Open Elective - IV  
Data Analytics for Business Applications

Total Credits (III Sem to VIII Sem) : 122

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**Syllabus for Semester I / II**  
(Civil Engineering, Industrial Engineering)

Course Code: PHT151  
Course : PHYSICS : Mechanics

L: 3 Hrs. T: 1 Hrs. P: 0 Hrs. Per week  
Total Credits: 4

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Course Objectives:
1. To develop working knowledge of methods to treat particle and rigid body motions;  
2. To introduce kinematics and dynamics of general rigid body motions.

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Course Outcomes:
1. be able to understand and work with free, damped and forced oscillations;  
2. be able to recognize and work problems with conservative as well as non-conservative forces;  
3. be able to use vector differential operations in solving mechanics problems;  
4. understand how to describe and solve simple general rigid body motions.

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Module 1: Forces, Newton’s Laws (8L)  
Coordinate frames, change of frames as linear transformation, rotation matrix, Scalars and vectors - Denition based on their transformation under change of frames; Examples and problems; Newton’s Laws of Motion, First law (law of inertia), inertial frame; Second law, concept of force; Third law; Forces in Nature, derived forces; friction, pressure in a fluid; Examples and problems including friction and constraints.

Module 2: One, and Two-dimensional Motion (7L)  
One-dimensional harmonic oscillator, damped oscillator, over, critical and under damping; Forced oscillator, undamped and damped cases; Examples, resonance and Q factor; Projectile motion with drag; Two-dimensional oscillator; Charged particle in constant magnetic field.

Module 3: Conservative Forces (5L)  
Work and kinetic energy: work-energy theorem, scalar and vector fields, Work done by a force field; Conservative and non-conservative forces, Potential energy function for conservative forces; Gradient of potential energy, \( F = -\nabla V \); Curl of a vector field, test of conservation character of a force; Potential near equilibrium point.

Module 4: Angular Momentum, System of Particles (6L)  
Angular momentum of a particle, torque of force; Radial-polar coordinates, Planetary orbits and Kepler’s laws; elliptical, parabolic and hyperbolic trajectories; “\( L \)” of a system of particles, torque of external forces, \( \frac{dL}{dt} = \mathbf{\tau}_{\text{ext}} \)

Module 5: Rigid Body Dynamics-I (5L)  
Denition of a rigid body, rotation in a plane, angular momentum about a point of rigid body in planar motion about a fixed axis, Kinematics, concept of moment of inertia; The physical pendulum.
Module 1: Oscillations (8L)
Quick review of simple harmonic motion, mechanical and electrical oscillators, vector and complex number (phasor) representation, superposition of many SHMs of equal amplitude and equal successive phase difference; Damped oscillations, under, critical and over-damping with stress on mechanical oscillators, problems; Forced oscillations with focus on mechanical oscillations, impedance of a mechanical circuit, forcing frequency dependence of velocity, displacement in a forced oscillator, two components of displacement, energy and power supplied by driving force, Q factor.

Module 2: Waves - 1 (5L)
Correlated harmonic oscillations in space and time, statement and meaning of the wave equation, general solution, concept of polarization of waves - transverse and longitudinal waves; Transverse wave on a string, characteristic impedance, reflection and transmission at a string-string boundary, impedance matching, insertion of quarter-wave element.

Module 3: Waves - 2 (5L)
Group of waves, group velocity, meaning of dispersion, causes of dispersion; Standing waves, normal modes of vibrating string, energy in modes, standing wave ratio; Longitudinal waves: sound waves in gases, statement and meaning of expressions for energy distribution and intensity.

Module 4: Wave Optics - 1 (6L)
Light as a transverse polarized electromagnetic wave in vacuum and in homogeneous isotropic dielectric, impedance \( \frac{|E|}{|H|} \) and \( \frac{|E|}{|H|} \) vectors, energy; Reflection and refraction of em wave at dielectric-dielectric boundary, parallel and perpendicular polarizations, boundary conditions on E and H components, Fresnel equations, Brewster’s angle.
Module 5: Wave Optics - 2 (6L)
Huygens’ principle, superposition, interference by division of amplitude and wavefront, Young’s double-slit, Newton’s rings, Michelson interferometer; Single-slit Fraunhofer diffraction, Rayleigh criterion for resolution, grating and its resolving power.

Module 6: Matter Waves (8L)
Plank’s energy packets, Wave-particle duality of de Broglie, Heisenberg uncertainty relations; Wave function, for matter waves and its interpretation, position and momentum operators, Hamiltonian operator, Schrodinger’s equation; One-dimensional single particle systems: Particle in an infinite square well potential (rigid box), finite square well potential; Quantum tunneling.

Text Book(s):

References:
1. Online course: Oscillations and Waves by S Bharadwaj on NPTEL

Programme Scheme & Syllabi For B.E. (Computer Science & Engineering)

Syllabus for Semester 1 / II
(Electronics Engineering, Electronics Design Technology, Electronics and Communication Engineering, Information Technology, Computer Science Engineering)
Course Code : PHT153
Course: Semiconductor Physics
L: 3 Hrs., T: 1 Hrs., P : 0 Hrs., Per week Total Credits : 4

Course Objectives:
1. To introduce ideas of quantum mechanics necessary to begin understanding semiconductor devices;
2. To familiarize prospective engineers with fundamental concepts of semiconductors and their interaction with light and resulting devices

Course Outcomes:
After successful completion of the course students will
1. have an elementary understanding of quantum behavior of electrons in solids;
2. have a grasp of band structure and its consequences for semiconductors;
3. should be able to use band structure to explain effects of doping, properties of junctions between semiconductors and metals;
4. have an elementary understanding of working of optoelectronics devices

Module 1: Quantum Mechanics Introduction (8L)
Wave-particle duality, Heisenberg uncertainty relations, the quantum state - wave function and its probability interpretation, Schrodinger’s equation, Energies and wave functions of a single electron in one-dimensional infinite and finite square well potentials: formulae, function graphs, number of bound states, Atomic orbitals, Concept of molecular bonding via overlap of orbitals and formation of molecular anti-bonding and bonding energy levels and wave functions: Qualitative description only.

Module 2: Electronic Materials (8L)
Free electron theory, Extension of idea of energy level splitting in molecules to bonding in solids, Energy bands in solids, Kronig-Penny model (to better demonstrate origin of band gaps), Band gap based classification of electronic materials: metals, semiconductors, and insulators, E-k diagram, Direct and indirect bandgaps.

Module 3: Electrons in Semiconductors (4L)

Module 4: Intrinsic and Extrinsic Semiconductors (6L)
Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Continuity equation, Metal-semiconductor junction (Ohmic and Schottky).
Module 5: Light - Semiconductors Interaction (6L)
Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; joint density of states, Density of states for photons, Transition rates (Fermi’s golden rule), Optical loss and gain, Semiconductor materials of interest for optoelectronic devices; Photovoltaic effect, Exciton, Drude model, LED, Photodiode.

Module 6: Engineered Semiconductor Materials (6L)
Low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Energies and wave functions in three dimensions with one, two, or all three dimensions of nanosizes, Density of states for 2D, 1D and 0D electron gases, Hetero-junctions and associated band diagrams.

Text Book(s):

References:
1. Online course: Semiconductor Optoelectronics by M R Shenoy on NPTEL
2. Online course: Optoelectronic Materials and Devices by Monica Katiyar and Deepak Gupta on NPTEL

Syllabus of Physics Lab for Semester II, Bachelor of Industrial, Civil Engineering

Course Code : PHP151
Course : Mechanics Lab
L:0 Hr., T:0Hrs., P:3 Hrs., Per week
Total Credits : 1.5

Course Outcomes
The Physics Laboratory course will consist of experiments illustrating the principles of physics relevant to the study of science and engineering. Students will show that they have learnt laboratory skills that will enable them to properly acquire and analyze the data in physics laboratory and draw valid conclusions. At the end of the Course the students will learn to:
1. Develop skills to impart practical knowledge in real time.
2. Understand principle, concept, working and application of areas in physics and compare the results obtained with theoretical calculations.
3. Understand measurement technique, and report the results obtained through proper graph plotting and error analysis.

In addition to the demo experiments, the Lab turns will be utilized for performing the experiments based on the following list:
1. Error analysis and graph plotting
2. g by free fall
3. To determine acceleration due to gravity by compound pendulum
4. To determine the moment of inertia of a body using torsion pendulum
5. Young’s modulus by bending of beam
6. Young’s modulus by vibrational method
7. To study damping of a bar pendulum
8. Fixed pulley, loose pulley, and block and tackle as simple machine
9. Static friction, sliding friction, and rolling friction
10. Force oscillation and resonance
11. To study the oscillation of a mass in combinations of two springs and hence determination of force constant
12. Measurement of linear expansion of solid as a function of temperature
13. Determination of thermal conductivity of building materials using single plate model or heat flux plate principle
14. Thermal diffusivity Used for measuring the thermal diffusivity and thermal conductivity of brass.
15. Thermal conductivity of a bad conductor by Lee’s disc method.

Suggested References:
1. Physics Lab Manual written by the Teaching Faculty of Physics Department, RCOEM.
   A minimum of 8 experiments to be performed from the following list of experiments
Syllabus of Physics Lab for Semester I/II
(Semester-I: Electrical Engineering, Semester-II: Mechanical Engineering)
Course Code : PHP152      Course : Oscillations, Waves, Optics lab
L: 0 Hrs. T: 0 Hrs. P: 3 Hrs. Per week      Total Credits : 1.5

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Course Outcomes
The Physics Laboratory course will consist of experiments illustrating the principles of physics relevant to the study of science and engineering. Students will show that they have learnt laboratory skills that will enable them to properly acquire and analyze the data in physics laboratory and draw valid conclusions. At the end of the Course the students will learn to:

1. Develop skills to impart practical knowledge in real time.
2. Understand principle, concept, working and application of areas in physics and compare the results obtained with theoretical calculations.
3. Understand measurement technique, and report the results obtained through proper graph plotting and error analysis.

In addition to the demo experiments, the Lab turns will be utilized for performing the experiments based on the following lists as specific to Program:

1. Error analysis and graph plotting
2. Wave length, frequency and phase velocity of travelling wave.
3. Wavelength of source of light using Newton’s rings
4. To study the oscillation in bifilar suspension arrangement
5. Determination of velocity of sound in liquid—standing ultrasonic waves as optical grating
6. Kundt’s tube – Determination of the wavelength of sound with the cork powder method
7. Determination of velocity of sound in solid
8. Beating of ultrasonic waves
9. Investigation of Doppler effect with ultrasonic waves
10. Refractive Index of prism
11. Frequency, amplitude and phase determination using C.R.O.
12. Study of surface flatness using interference phenomena
13. To determine the resolving power of grating
14. Study of Polarizers and Analyzers
15. Study of total internal reflection using Laser source
16. Data analysis using Mathematica

Suggested References:
1. Physics Lab Manual written by the Teaching Faculty of Physics Department, RCOEM.
A minimum of 8 experiments are to be performed from the above list of experiments.

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### Shri Ramdeobaba College of Engineering & Management, Nagpur

#### Syllabus for B.E. Semester I

<table>
<thead>
<tr>
<th>Course Code: MAT151</th>
<th>Course: Mathematics-I: Calculus</th>
</tr>
</thead>
<tbody>
<tr>
<td>L: 3 Hrs., T: 1 Hrs., P: 0 Hrs., Per week</td>
<td>Total Credits: 04</td>
</tr>
</tbody>
</table>

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in Calculus and multivariate analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics & applications that they would find useful in their disciplines.

**Course Outcomes**
On successful completion of the course, the students will learn:
1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions, and the fallouts of Rolle’s Theorem that is fundamental to application of analysis to Engineering problems.
3. To deal with functions of several variables that are essential in most branches of engineering.

**Textbooks/References:**


#### Syllabus for B.E. Semester II

<table>
<thead>
<tr>
<th>Course Code: MAT152</th>
<th>Course: Mathematics-II: Differential Equations, Linear Algebra, Statistics &amp; Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>L: 3 Hrs., T: 0 Hrs., P: 0 Hrs., Per week</td>
<td>Total Credits: 03</td>
</tr>
</tbody>
</table>

**Course Objective:**
The objective of this course is to familiarize the prospective engineers with techniques in ordinary differential equation, statistics, probability and Matrices. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

**Course Outcomes**
On successful completion of the course, the students will learn:
1. The effective mathematical tools for the solutions of ordinary differential equations that model physical processes.
2. The essential tool of matrices in a comprehensive manner.
3. The ideas of probability and various discrete and continuous probability distributions and the basic ideas of statistics including measures of central tendency, correlation and regression.

**Syllabus**

**Module 1: First order ordinary differential equations (8 hours)**
- Exact, linear and Bernoulli’s equations, Euler’s equations, Equations Not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

**Module 2: Ordinary differential equations of higher orders (8 hours)**
- Second order linear differential equations with constant and variable coefficients, method of variation of parameters, Cauchy-Euler equation.

**Module 3: Basic Statistics (7 hours)**
- Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves, correlation and regression – Rank correlation, Multiple regression and correlation.

**Module 4: Basic Probability (8 hours)**
- Probability spaces, conditional probability, independence; Discrete random variables, Binomial distribution, Poisson distribution, Normal distribution. Relation between binomial, Poisson and Normal distributions.

**Module 5: Matrices (10 hours)**

**Textbooks/References:**


Course Code : MAP151      Course : Computational Mathematics Lab
L:0 Hr., T:0 Hrs., P:2 Hrs., Per week      Total Credits : 1

Course Outcomes
The Computational Mathematics Lab course will consist of experiments demonstrating the principles of mathematics relevant to the study of science and engineering. Students will show that they have learnt laboratory skills that will enable them to properly acquire and analyze the data in the lab and draw valid conclusions. At the end of the Course the students will learn to:
1. Develop skills to impart practical knowledge in real time.
2. Understand principle, concept, working and application of areas in mathematics and compare the results obtained with theoretical calculations.
3. Understand basics of mathematics, and report the results obtained through proper programming.

The Lab turns will be utilized for performing the experiments based on the following list:
1. Calculus
2. Ordinary Differential Equations
3. Statistics
4. Linear Algebra

Suggested References:
1. Computational Mathematics Lab Manual written by the Teaching Faculty of Mathematics Department, RCOEM.

A minimum of 8 experiments to be performed based on the above list.

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Syllabus of Group 1 - Semester I  and Group 2 - Semester II, Bachelor of Engineering

Course Code : EET151      Course : Basic Electrical Engineering

Course Outcomes:
At the end of this course, students will demonstrate the ability
CO1: To understand and analyze basic electric and magnetic circuits.
CO2: To study the working principles of electrical machines and power converters.
CO3: To study the working principles of power converters.
CO4: To introduce the components of power systems and low-voltage electrical installations.

Module 1: Introduction to Power system (2 hours) - CO1:
Introduction to Power Generation (Thermal, Hydro, Nuclear, Wind, and Solar) with block schematic presentation only. Single line diagram for Generation, Transmission & Distribution through different voltage levels.

Module 2 : DC Circuits & Magnetic Circuits (8 hours) - CO1:
Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation, Time-domain analysis of first order RL and RC circuits, Magnetic materials, BH characteristics, Basics of Magnetic circuits.

Module 3: Single Phase AC Circuits (6 hours) - CO1:
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.

Module 4: Three Phase AC Circuits (4 hours) - CO1:
Three phase Ac generation, Three phase balanced circuits, voltage, and current relations in star and delta connections. Power factor improvement.

Module 5: Transformers (6 hours) - CO2:
Ideal and practical transformer, Equivalent circuit, losses in transformers, regulation, and efficiency. Auto transformer and three-phase transformer connections.

Module 6: Electrical Machines (8 hours) - CO2:

Module 7: Power Converters (4 hours) - CO3:
Block schematic introduction to power converters and its practical applications (DC-DC, DC-AC, AC-DC, AC-AC), Types of Batteries, Important Characteristics for Batteries and battery backup.

Module 8: Electrical Installations (4 hours) - CO4:
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, energy tariff.

Text / References:
Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering

Course Code : EEP151      Course: Basic Electrical Engineering Lab.

Laboratory Outcomes:
The students are expected to

CO1: Get an exposure to common electrical components and their ratings.
CO2: Make electrical connections by wires of appropriate ratings.
CO3: Understand the usage of common electrical measuring instruments.
CO4: Understand the basic characteristics of transformers and electrical machines.
CO5: Get an exposure to the working of power electronic converters.

List of Laboratory Experiments/Demonstrations:
3. Transformers: Observation of the no-load current waveform on an oscilloscope (non sinusoidal waveform due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding - slip ring arrangement) and single-phase induction machine.
7. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections.
8. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

Syllabus of Department of Mechanical Engineering

Course Code : MET151      Course: Engineering Graphics and Design

Course Outcomes
The expected learning outcome is that, the students shall be able to
1. Draw and interpret technical drawing
2. Convert 2-D to 3-D drawing and vice versa.
3. Represent the various positions of planes and solids in different orientations.
4. Develop the solid surface for sheet metal working.

UNIT 1: Introduction to Engineering Drawing

UNIT 2: Orthographic Projections
Principles of Orthographic Projections - Conventions: Projections of Points and lines (line inclined to both planes) Projections of planes (inclined to both the planes), Introduction to Auxiliary Planes;

UNIT 3: Projections of Solids
Inclined to both the Planes - Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 4: Sections and Sectional Views of Right Angular Solids
Prism, Cylinder, Pyramid Cone-Auxiliary Views; Development of surface of Right Regular solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT 5: Isometric Projections
Principles of Isometric projection - Isometric Scale, Isometric Views, Conventions; Isometric Views of Simple Solids; Conversion of Orthographic views to Isometric Views / Projection.

Suggested Text / Reference Books:
vii) Corresponding set of CAD Software Theory and User Manuals.
Syllabus of Department of Mechanical Engineering

Course Code : MEP151      Course: Engineering Graphics & Design Lab
L:0 Hr., T:0 Hrs., P:4 Hrs., Per week     Total Credits : 02

Course Outcomes
Students are prepared for actual work situations through practical training in a new state of the art computer designed CAD laboratory using engineering software. The student will learn to:

1. Draw and interpret technical drawing
2. Plan the sheet layout for the given drawing
3. Convert 2-D to 3-D drawing and vice versa
4. Represent the various positions of planes and solids in different orientations.
5. Develop the solid surface for sheet metal working
6. Use & demonstrate drafting package.

UNIT 1 : Introduction to Engineering Drawing
Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloids, Hypocycloid and involutes; Introduction to Scales.

UNIT 2 : Orthographic Projections
Principles of Orthographic Projections - Conventions - Projections of Points and lines inclined to both planes; Projections of planes - Auxiliary Planes.

UNIT 3 : Projections of Solids
Inclined to both the Planes Auxiliary Views; Draw simple annotation, dimensioning and scale, Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

UNIT 4 : Sections and Sectional Views of Right Angular Solids
Prism Cylinder, Pyramid, Cone - Auxiliary Views; Development of surfaces of Right Regular Solids Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT 5 : Isometric Projections
Principles of Isometric projection - Isometric Scale, Isometric Views, Conventions; Isometric Views of Simple Solids; conversion of Orthographic views to isometric views / Projection

UNIT 6 : Overview of Computer Graphics
Demonstrating knowledge of the theory of CAD software such as the Menu System Toolbars Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, crosshairs, Coordinate Systems), Dialog boxes and windows, Shortcut menus (Button Bars), The command Line (wherever applicable), The Status Bar, Different methods of zoom as used in CAD, select and erase objects; Isometric Views of lines, Planes, Simple and compound solids;

UNIT 7 : Customization & CAD Drawing
Setting up drawing page and the printer, including scale settings, Setting up of units and Drawing limits, ISO and ANSI standards for coordinate dimensioning; Orthographic constraints, map to objects, manually and automatically, Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Suggested Text / Reference Books:

vi) (Corresponding set of CAD Software Theory and USER Manuals.)
Syllabus for B.E. Semester I Department of Humanities
Course Code: HUT152 Course: Constitution of India
L: 2 Hrs. T: 0 Hrs. P: 0 Hrs. Per week Total Credits: 0

Course outcome
1. Students will understand the role of constitution in democratic India
2. Students will be responsible students by knowing their fundamental rights and duties
3. Students will develop better understanding of democratic functions of the government of India
4. Students will form better understanding of system of governance for effective participation

Course content
1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the Fundamental Rights
5. The scheme of the Fundamental Duties – its importance and implementation
6. Federal structure and distribution of legislative and financial powers between the Union and the States
7. Parliamentary Form of Government in India – The constitution powers and status of the President of India
8. Union Executive: structure, functions
9. Judiciary: Structure, role with special reference to PIL, writ petitions, strengthening of democracy & social justice
10. Amendment of the Constitutional Powers and Procedure
12. Local Self Government – Constitutional Scheme in India
13. Provisions of civil services: Characteristics, functions, merits and demerits
14. Democratic principles in industry

Book

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Syllabus for B.E. Semester I / II
Course Code: CHT151 Course: Chemistry
L: 3 Hrs. T: 1 Hr. P: 0 Hr., Per week Total Credits: 4

Course Outcomes
The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nano meter levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electro negativity, oxidation states and electro negativity.
- List major chemical reactions that are used in the synthesis of molecules.

(i) Chemistry-I (Concepts in Chemistry for Engineering)
(ii) Atomic and molecular structure (12 lectures)

(iii) Spectroscopic techniques and applications (8 lectures)

(iv) Interatomic forces and potential energy surfaces (4 lectures)

(v) Use of free energy in chemical equilibria (6 lectures)

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(v) Periodic properties (4 Lectures)
   Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

(vi) Stereochemistry (4 lectures)
   Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry & chirality, enantiomers, diastereomers, optical activity, absolute configurations & conformational analysis. Isomerism in transitional metal compounds.

(vii) Organic reactions and synthesis of a drug molecule (4 lectures)
   Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Suggested Text Books
(i) University chemistry, by B. H. Mahan
(iii) Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(iv) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(v) Physical Chemistry, by P. W. Atkins
(vii) Selected topics in Inorganic Chemistry by Malik, Madan & Tuli.

Shri Ramdeobaba College of Engineering & Management, Nagpur

Programme Scheme & Syllabi For B.E. (Chemistry Lab)

Course Code : CHP151  Course : Chemistry Lab
L: 0 Hrs., T: 0 Hrs., P: 3 Hrs., Per week  Total Credits : 1.5

Laboratory Outcomes
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials and impurities in water etc.
- Synthesize a polymer or drug molecule or nano-material.

List of Experiments for Chemistry Lab
1. Determination of Surface tension and Viscosity of a given liquid.
2. Determination of total hardness and alkalinity of a given water sample.
4. Determination of Cu and Zn in a brass sample.
5. Determination of partition coefficient of a substance between two immiscible liquids.
6. Study of chemical oscillations or iodine clock reaction.
7. Estimation of acid value and saponification value of oil.
8. Determination of cell constant and conductometric titration of strong acid vs. strong base.
9. Colligative properties using melting point.
10. Determination of rate constant of a reaction.
13. Adsorption of acetic acid by charcoal.
14. Demonstration of UV-Visible spectrophotometer and FTIR
Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering
Course Code: CST151      Course : Programming for Problem Solving
L: 4 Hrs., T: 0 Hrs., P: 0 Hrs., Per week
Total Credits : 4

Course Outcomes:
On successful completion of course student will learn:
1. To formulate simple algorithms for arithmetic and logical problems, translate the algorithms to programs (in C language), test and execute the programs and correct syntax and logical errors.
2. To implement conditional branching, iteration and recursion, to decompose a problem into functions and synthesize a complete program using divide and conquer approach.
3. To use arrays, pointers, structures and I/O operations for the formulation of algorithms and programs.
4. To apply programming to solve matrix addition, multiplication problems and searching & sorting problems.

UNIT-I: Introduction to Programming
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)
Idea of Algorithm : Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart / Pseudocode with examples. Arithmetic expressions and precedence

UNIT-II: C Programming Language
Introduction to C language: Keywords, Constant, Variable, Data types, Operators, Types of Statements, Preprocessor Directives, Decision Control Statement-if, if-else, Nested if-else statement, Switch case, Loops and Writing and evaluation of conditionals and consequent branching.

UNIT-III: Arrays and Basic Algorithms
Arrays: 1-D, 2-D, Character arrays and Strings.
Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT-IV: Functions and Recursion
User defined and Library Functions, Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference. Recursion: As a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-V: Pointers and Structures
Structures, Defining structures, Array of Structures, Introduction to pointers, Defining pointers, Pointer arithmetic, pointer operators, Use of Pointers in self-referential structures, notion of linked list (no implementation)

UNIT-VI: File handling
Streams in C, Types of Files, File Input/Output Operations: Modes of file opening, Reading and writing the file, Closing the files, using flush().

Text Books:

Reference Books:
1. Programming with C: Byron Gottfried, Schaums Outline Series.
2. Let Us C: Yashwant Kanetkar, BPB Publication

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Syllabus of Group 1 - Semester I and Group 2 - Semester II, Bachelor of Engineering
Course Code: CSP151      Course : Programming for Problem Solving Lab
L: 0 Hrs., T: 0 Hrs., P: 2 Hrs., Per week
Total Credits : 1

Course Outcomes:
On successful completion of course student will be able to:
1. Understand the fundamentals of C programming and choose the loops and decision making statements to solve and execute the given problem.
2. Implement different Operations on arrays also design functions to solve the given problem using C programming.
3. Understand pointers, structures, unions and apply them to develop programs.
4. Implement file Operations in C programming for a given application.
Course Outcomes

1. Identify the different manufacturing processes commonly employed in Industry along with prevailing safety practices.
2. Identify the various tools and equipment to carry out different manufacturing processes accompanied by the inspection of the work part.

Detailed Topics

Unit 1: Fundamentals of metal cutting, single point cutting tool, fundamental mechanics of metal cutting, fitting operations, and associated measuring and marking tools.

Unit 2: Introduction to pattern making for metal casting, different types of carpentry tools, measuring tools and marking tools, holding devices, different types of carpentry joints.

Unit 3: Smithy and Forging, Forging tools like chisels, hammers, types of furnaces, types of coal, forming operations, Hot working and Cold working of metals.

Unit 4: Metal joining Process, mechanics of welding, types of welding, soldering and brazing, types of joints.

Unit 5: Introduction to foundries, Metal Casting, types of sand, introduction to Molding tools & casting process.

Unit 6: Introduction to Plastic Injection Molding.

Suggested Textbook

Reference Books

Course Assignments for internal continuous assessment of 20 Marks (NO T1 and T2)

- Brain teasers (aka Puzzle Busters, to be solved individually)
- Cartoon captions (small teams)
- TRIZ, a systematic ideation method, reading (individual)
- Book readings and discussions (small teams)
- Small teams presentations on innovation: (1) innovative individual, (2) innovative company, (3) innovative movie/game, (4) sustainable innovation, (5) innovation in business, (6) innovation in art, (7) innovation in architecture, (8) innovative nation, (9) innovation in science, and (10) innovation in engineering.
- Large group’s hands-on projects
- Eight-dimensional (8D) ideation method examples
- Large teams videos
Laboratory Outcomes
On the completion of the course the students shall be able to:
1. Recognize the different manufacturing process commonly employed in the Industry
2. Make the components using required manufacturing process, inspection methods while practicing the requisite safety precautions

Contents
1. Fitting Practice
2. Welding and Soldering Practice
3. Pattern Making Practice
4. Metal Casting Practice
5. Smithy and Forging Practice
6. Machining Practice
7. Plastic Molding Process
8. Glass Cutting Process

Suggested Text Books

Reference Books

Course Objectives
The main objective of the subject is to enhance the employability skills of engineering students as well as communication skills at work place. The sub-objectives are:
1. To develop vocabulary of students.
2. To orient students in basic writing skills.
3. To orient students in functional grammar.
4. To orient students in the process of effective writing.
5. To provide practice and improve students’ oral communication skills.

Course Outcomes
1. Students will have good word power.
2. Students will acquire basic writing skills.
3. Students will understand functional grammar and its usage.
4. Students will organize and express their thoughts effectively through written communication.
5. Students will learn oral communication skills in order to handle themselves effectively in an interview and group discussion

SYLLABUS
1. Vocabulary Building
   1.1. The concept of Word Formation
   1.2. Root words from foreign languages and their use in English
   1.3. Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives
   1.4. Synonyms, Antonyms and standard abbreviations
2. Basic Writing Skills
   2.1 Sentence Structures
   2.2 Use of phrases and clauses in sentences
   2.3 Importance of proper punctuation
   2.4 Creating coherence
   2.5 Organizing principles of paragraphs in documents
   2.6 Techniques for writing precisely
3. Identifying Common Errors in Writing
   3.1 Subject-verb agreement
   3.2 Noun-pronoun agreement
   3.3 Misplaced modifiers
   3.4 Articles
   3.5 Redundancies
   3.6 Cliches
4. Nature and Style of sensible Writing
   4.1 Describing
   4.2 Defining
   4.3 Classifying
   4.4 Providing examples or evidence

5. Writing Practices
   5.1 Comprehension
   5.2 Precis Writing
   5.3 Essay Writing
   5.4 Letter Writing
   5.5 Email Writing

6. Oral Communication
   (This unit involves interactive practice sessions in Language Lab)
   • Listening Comprehension
   • Pronunciation, Intonation, Stress and Rhythm
   • Common Everyday Situations: Conversations and Dialogues
   • Communication at Workplace
   • Interviews
   • Formal Presentations

Books