B.Tech. SYLLABUS
(I and II Semesters)
2013-14

NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI 620015
TAMILNADU, INDIA
## CURRICULUM FOR I AND II SEMESTERS B. Tech.

### I SEMESTER

<table>
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* Only two of the three basic engineering courses will be introduced to students based on their branch of study
HM101 ENGLISH FOR COMMUNICATION

Objectives
The primary objective is to develop in the under-graduate students of engineering a level of competence in English required for independent and effective communication for academic and social needs.

Course Material
Instruction will be provided through appropriate material – articles from popular magazines, newspapers, technical journals, samples from industries and also text books. Practice in the four language skills necessary for their specific technical requirements will be provided in an integrated manner.

Course Content
Communication An introduction - Its role and importance in the corporate world – Tools of communication – Barriers – Levels of communication – English for Specific purposes and English for technical purposes.

Listening Listening process & practice – Exposure to recorded & structured talks, class room lectures – Problems in comprehension & retention – Note-taking practice – Listening tests- Importance of listening in the corporate world.


Expected Outcome
The students will be able to express themselves in a meaningful manner to different levels of people in their academic and social domains.

Text Books

Reference Books
MA101 MATHEMATICS I

Objectives  To acquire fundamental knowledge and apply in engineering disciplines.


Sequences of real numbers – Limit of a sequence – Convergent and divergent sequences – sub sequence- Cauchy’s sequence – monotone convergence theorem (without proof)- Sequence with recurrence relations.


Double integral – Changing the order of Integration – Change of variables from Cartesian to Polar Coordinates – Area using double integral in Cartesian and Polar Coordinates – Triple integral – Change of Variables from Cartesian to Spherical and Cylindrical Coordinates – Volume using double and triple integrals.

Outcome
After the completion of the course, students would be able to solve curriculum problems.

Text Books

Reference Books
PH101 PHYSICS I
(Common to all branches)

Objectives
To make a bridge between the physics in school and engineering courses.
To introduce the basic concepts of modern science like Photonics, Engineering applications of acoustics, fundamentals of crystal physics and materials science.

Lasers

Fiber Optics

Acoustics

Crystallography

Magnetic materials, conductors and superconductors
Conductors: classical free electron theory (Lorentz –Drude theory) – electrical conductivity
Outcome
The student will be able to understand many modern devices and technologies based on lasers and optical fibers. Student can also appreciate various material properties which are used in engineering applications and devices.

Text Books

Reference Books

Laboratory Experiments
1. Torsional pendulum
2. Numerical aperture of an optical fiber
3. Temperature measurement - Thermocouple
4. Specific rotation of a liquid – Half Shade Polarimeter
5. Thickness of a thin wire – Air Wedge
6. Conversion of galvanometer into ammeter and voltmeter
7. Dispersive power of a prism – Spectrometer
8. Superconductivity- measurement of transition temperature
9. Absorption spectrometer
10. Brewster’s Angle measurement
11. Measurement of Young’s modulus

Reference Books
1. Practical Physics, R.K. Shukla, Anchal Srivastava, New age international (2011)
CH 101 CHEMISTRY I  
(Common to all branches)

**Objectives**  To introduce students to water chemistry, bonding concepts, entropy and basic organic chemistry.

**Water**

Sources, hard & soft water, estimation of hardness by EDTA method, softening of water, zeolite process & demineralization by ion exchangers, boiler feed water, internal treatment methods, specifications for drinking water, BIS & WHO standards, treatment of water for domestic use, desalination - reverse osmosis & electrodialysis.

**Chemical Bonding**

Basic concepts, bonding in metals, electron gas theory, physical properties of metals (electrical & thermal conductivity, opaque & lusture, malleability & ductility), Alloy-substitutional alloys, interstitial alloys.

Coordinate bond, EAN rule, 16 & 18 electron rule, crystal field theory, splitting of 'd' orbitals in octahedral, tetrahedral and square planar complexes.

**Shape & Intermolecular Interactions**

Shape-Lewis dot structures, formal charge, VSEPR method, consequences of shape, dipole moment, valence bond theory; Intermolecular interactions-ion ion interactions, ion-dipole interactions, hydrogen bonding, dipole-dipole interactions, London / dispersion forces, relative strength of intermolecular forces; Consequences-surface tension.

**Thermodynamics**

Entropy as a thermodynamic quantity, entropy changes in isothermal expansion of an ideal gas, reversible and irreversible processes, physical transformations, work & free energy functions, Helmholtz and Gibbs free energy functions, Gibbs-Helmholtz equation, Gibbs-Duhem equation, Clapeyron-Clausius equation & its applications, Van't Hoff isotherm and applications.

**Fuels & Lubricants**

Fuels - Classification, examples, relative merits, types of coal, determination of calorific value of solid fuels, Bomb calorimeter, theoretical oxygen requirement for combustion, proximate & ultimate analysis of coal, manufacture of metallurgical coke, flue gas analysis, problems.  Lubricants - Definition, theories of lubrication, characteristics of lubricants, viscosity, viscosity index, oiliness, pour point, cloud point, flash point, fire point, additives to lubricants, Solid lubricants.
Outcome
Students will learn about quality of water, bonding theories, entropy change for various processes and basic stereo chemical aspects.

Text Books

Reference Books

Laboratory Experiments
1. Estimation of total alkalinity in the given water sample.
2. Estimation of carbonate, non-carbonate and total hardness in the given water sample.
3. Estimation of dissolved oxygen in the given water sample.
4. Determination of the percentage of Fe in the given steel sample.
5. Estimation of Ca in limestone.
6. Estimation of Fe$^{3+}$ by spectrophotometer.

Reference Books
1. Laboratory Manual, Department of Chemistry, NITT
ME101 ENGINEERING MECHANICS
(Common to all branches)

Objectives
To explain the importance of mechanics in the context of engineering and conservation equations.
To explain the significance of centroid, centre of gravity and moment of inertia.
To introduce the techniques for analyzing the forces in the bodies.
To apply the different principles to study the motion of a body, and concept of relative velocity and acceleration.
To describe the trajectory of a particle under projectile motion.
To identify the basic elements of a mechanical system and write their constitutive equations.


Friction  Laws of friction, static friction, rolling friction, application of laws of friction, ladder friction, wedge friction, body on inclined planes, simple screw jack – velocity ratio, mechanical advantage, efficiency, Numerical.

Statics  Principles of statics, types of forces, concurrent and non-concurrent forces, composition of forces, forces in a plane and space, simple stresses and strains, elastic coefficients, Numerical.

Kinematics  Fundamentals of rectilinear and curvilinear motion, application of general equations, concept of relative velocity, analytical and graphical techniques, Numerical.

Dynamics  Principles of dynamics, D’Alembert’s principle, conservation of momentum and energy, vibrations of simple systems, Numerical.

Outcome
The terminal objectives of the course is that, on successful completion of teaching-learning and evaluation activities, a student would be able to identify and analyze the problems by applying the fundamental principles of engineering mechanics and to proceed to research, design and development of the mechanical systems.
Text Books

Reference Books
CS101 BASICS OF PROGRAMMING

Objectives
To learn the fundamentals of computers
To learn the problem solving techniques writing algorithms and procedures
To learn the syntax and semantics for C programming language
To develop the C code for simple logic
To understand the constructs of structured programming including conditionals and iterations

Introduction to computers – Computer Organization – Characteristics – Hardware and Software – Modes of operation – Types of programming languages – Developing a program.


Modular Programming – Functions and Procedures – Examples – Parameter passing methods.


Outcome
Ability to write algorithms for problems
Knowledge of the syntax and semantics of C programming language
Ability to code a given logic in C language
Knowledge in using C language for solving problems
Text Books

Reference Books

Laboratory Experiments
1. Programs using sequence construct
2. Programs using selection construct
3. Programs using Iterative construct
4. Programs using nested for loops
5. Programs using functions with Pass by value
6. Programs using functions with Pass by reference
7. Programs using recursive functions
8. Programs using one dimensional Array
9. Programs using two dimensional Arrays
10. Programs using Pointers and functions
11. Programs using Pointers and Arrays
CC101 ENERGY AND ENVIRONMENTAL ENGINEERING

COURSE OBJECTIVE
1. To teach the principal renewable energy systems.
2. To explore the environmental impact of various energy sources and also the effects of different types of pollutants.

Present Energy resources in India and its sustainability - Different type of conventional Power Plant--Energy Demand Scenario in India-Advantage and Disadvantage of conventional Power Plants – Conventional Vs Non-conventional power generation
Power and energy from wind turbines- India’s wind energy potential- Types of wind turbines- Off shore Wind energy- Environmental benefits and impacts.
Biomass resources-Biomass conversion Technologies- Feedstock preprocessing and treatment methods- Bioenergy program in India-Environmental benefits and impacts.
Air pollution- Sources, effects, control, air quality standards, air pollution act, air pollution measurement. Water pollution-Sources and impacts, Soil pollution-Sources and impacts, disposal of solid waste.

OUTCOME
Students will be introduced to the:
1. Principal renewable energy systems
2. Explore the environmental impact of various energy sources and also the effects of different types of pollutants.

TEXT BOOKS

REFERENCES
MP101 ENGINEERING GRAPHICS

Objectives
Irrespective of engineering discipline, it has become mandatory to know the basics of Engineering graphics. The student is expected to possess the efficient drafting skill depending on the operational function in order to perform day to day activity.
Provide neat structure of industrial drawing
Enables the knowledge about position of the component and its forms
Interpretation of technical graphics assemblies
Preparation of machine components and related parts

Fundamentals Drawing standard - BIS, dimensioning, lettering, type of lines, scaling - conventions.
Geometrical constructions Dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and hexagon – conic sections – ellipse – parabola – hyperbola - cycloid – trochoid.
Orthographic projection Introduction to orthographic projection, drawing orthographic views of objects from their isometric views - Orthographic projections of points lying in four quadrants, Orthographic projection of lines parallel and inclined to one or both planes Orthographic projection of planes inclined to one or both planes. Projections of simple solids - axis perpendicular to HP, axis perpendicular to VP and axis inclined to one or both planes.
Sectioning of solids Section planes perpendicular to one plane and parallel or inclined to other plane.
Intersection of surfaces Intersection of cylinder & cylinder, intersection of cylinder & cone, and intersection of prisms.
Development of surfaces Development of prisms, pyramids and cylindrical & conical surfaces.
Isometric and perspective projection Isometric projection and isometric views of different planes and simple solids, introduction to perspective projection.
Computer aided drafting Introduction to computer aided drafting package to make 2-D drawings.
Self-study only, not to be included in examinations.
Demonstration purpose only, not to be included in examinations.

Outcome
Towards the end of the course it is expected that the students would be matured to visualize the engineering components. A number of chosen problems will be solved to illustrate the concepts clearly.

Text Books

Reference Books
PR 101 ENGINEERING PRACTICE

Objectives

Introduction to the use of tools and machinery in Carpentry, Welding, Foundry, Fitting and Sheet Metal Working.

Carpentry

Wood sizing exercise in planning, marking, sawing, chiseling and grooving to make

1. Half lap joint
2. Cross lap joint

Welding

Exercise in arc welding for making

1. Lap joint
2. Butt joint

Foundry

Preparation of sand mould for the following

1. Flange
2. Anvil

Fitting

Preparation of joints, markings, cutting and filling for making

1. V-joint
2. T-joint

Sheet metal

Making of small parts using sheet metal

1. Tray
2. Funnel
Objectives
The primary objective is to develop in the under-graduate students of engineering a level of competence in English required for independent and effective communication for their professional needs.

Course Material
Instruction will be provided through appropriate material – articles from popular magazines, newspapers, technical journals, samples from industries and also text books. Practice in the four language skills will be provided in an integrated manner.

Course Content
Listening: Barriers to listening: Physical & psychological – Steps to overcome them – Purposive listening practice – Active listening and anticipating the speaker – Use of technology in the professional world.


Writing Professional Correspondence – Formal and informal letters – Argument Writing practice – Perspectives in writing – Narrative writing -Different registers - Tone in formal writing – Summary writing practice- Introduction to reports.

Study Skills Reference Skills - Use of dictionary, thesaurus etc – Importance of contents page, cover & back pages – Bibliography.

Expected Outcome
The students will have knowledge of the various uses of English in their professional Environment and they will be able to communicate themselves effectively in their chosen profession.

Reference Books
4. Albert J. Harris, Edward R. Sipay (1990), How to Increase Reading Ability, Longman.
MA102 MATHEMATICS II

Objectives To learn mathematical concepts and methods.

Basic review of first order differential equation - Higher order linear differential equations with constant coefficients – Particular integrals for \( x^n e^{ax}, e^{ax} \cos (bx), e^{ax} \sin (bx) \) – Equation reducible to linear equations with constant coefficients using \( x = e^t \) - Simultaneous linear equations with constant coefficients – Method of variation of parameters – Applications – Electric circuit problems.

Gradient, Divergence and Curl – Directional Derivative – Tangent Plane and normal to surfaces – Angle between surfaces – Solenoidal and irrotational fields – Line, surface and volume integrals – Green’s Theorem, Stokes’ Theorem and Gauss Divergence Theorem (all without proof) – Verification and applications of these theorems.

Analytic functions – Cauchy – Riemann equations (Cartesian and polar) – Properties of analytic functions – Construction of analytic functions given real or imaginary part – Conformal mapping of standard elementary functions \( \{ z^2, e^z, \sin z, \cos z, z + \frac{k^2}{z} \} \) and bilinear transformation.

Cauchy’s integral theorem, Cauchy's integral formula and for derivatives– Taylor's and Laurent’s expansions (without proof) – Singularities – Residues – Cauchy's residue theorem – Contour integration involving unit circle.

Outcome After the completion of the course, students are able to solve industrially applicable problems.

Text Books

Reference Books
PH102A PHYSICS II
(Circuit Branches)

Objectives
To make a bridge between the physics in school and engineering courses.
To introduce the basic concepts of modern physics like fundamentals of quantum mechanics, nuclear physics and advanced materials.
To introduce fundamental physics like electrodynamics and semiconductor physics for circuit branch students.

Quantum Mechanics

Nuclear and Particle Physics
Nuclear properties and forces - Nuclear models - Shell model - Nuclear reaction - Radioactivity - types and half lives - application in determining the age of rock and fossils - Stellar nucleosynthesis. Fundamental forces - Particle physics - classification of matter - quark model - neutrino properties and their detection.

Advanced Materials
Shape memory alloys-one way and two way memory effect- pseudoelasticity-applications.

Electrodynamics

Semiconductor Physics
Introduction-Direct and indirect band gap semiconductors - Intrinsic semiconductor at 0 K- Intrinsic semiconductor at room temperature-Intrinsic carriers- Electron and Hole concentrations-doping-n-type – p-type-temperature variation of carrier concentration in extrinsic semiconductor-Extrinsic conductivity-Law of Mass action-Charge neutrality-Fermi level in extrinsic semiconductors-Electrical conduction in extrinsic semiconductors-Hall effect.
**Expected Out come**

The student will be able to understand fundamentals of electrodynamics and semiconductor physics which is base of many modern devices and technologies. Student will also get an exposure to modern physics topics like nuclear physics, nanotechnology and advanced materials.

**Text Books**


**Reference Books**

PH102B PHYSICS II
(Non-Circuit Branches)

Objectives
To make a bridge between the physics in school and engineering courses
To introduce the basic concepts of modern physics like fundamentals of quantum mechanics, nuclear physics and advanced materials.
To introduce the concepts of NDT and Vacuum Technology.

Quantum Mechanics

Nuclear and Particle Physics
Fundamental forces - Nuclear properties and forces - Nuclear models - Shell model - Nuclear reaction - Radioactivity - types and half lives - application in determining the age of rock and fossils - Neutrons and its applications (neutron diffraction, nuclear reaction etc)-Stellar nucleosynthesis. Particle physics - classification of matter - quark model- neutrino properties and their detection.

Advanced Materials
Shape memory alloys-one way and two way memory effect- pseudoelasticity-applications

Non-Destructive Testing

Vacuum Technology
Introduction-Exhaust pump and their characteristics-different types of pumps-rotary vane pump-roots pump-diffusion pump-turbo-molecular pump-measurement of low pressure-pirani gauge-penning guage - applications of vacuum technology - thin film deposition: thermal evaporation-sputtering.
**Expected Outcome**
Student will get an exposure to most modern and advanced concepts in nuclear physics, nanotechnology and advanced materials. Study of basic concept of NDT is very important for a modern engineer.

**Text Books**

**Reference Books**

**Laboratory Experiments**
1. Wavelength of sodium light – Newton’s rings
2. Thermal conductivity –Lee's Disc
3. Wavelength of mercury spectrum – Spectrometer
4. Calibration of Voltmeter – Potentiometer
5. Wavelength of laser using diffraction grating
6. Field along the axis of a Circular coil
7. Non-destructive testing by ultrasonic flaw detector.
8. GM counter experiment
9. Zeeman effect experiment
10. Millikan’s oil drop experiment
11. Kunds tube experiment

**Reference Books**
CH 102A CHEMISTRY II
(for CSE, ECE, EEE and ICE)

Objectives
To introduce the students to basic principles of electrochemistry, cell construction and evaluation, electrochemical power sources, the importance of corrosion in metal/alloy and polymer.

Electrochemistry
Conductivity of electrolytes- Specific, molar and equivalent conductivity, Nernst equation for electrode potential, EMF series, hydrogen electrode, calomel electrode, glass electrode, Electrolytic and galvanic cells, cell EMF, its measurement and applications, Weston standard cell, reversible and irreversible cells, concentration cell, electrode (hydrogen gas electrode) and electrolyte concentration cell, concentration cell with and without transference.

Corrosion
Dry corrosion and wet corrosion, mechanisms, types of corrosion, DMC, DAC, stress, intergranular, atmospheric and soil corrosion, Passivity, Polarization, over potential and its significance, Factors affecting corrosion, protection from corrosion by metallic coatings, electroplating, electroless plating and cathodic protection, Chemical conversion coatings and organic coatings- Paints, enamels.

Batteries

Solid State
Types of solids - close packing of atoms and ions - bcc, fcc structures of rock salt - cesium chloride- spinel - normal and inverse spinels, Stoichiometric Defect, controlled valency & Chalcogen semiconductors, Non-elemental semiconducting Materials, Preparation of Semiconductors-steps followed during the preparation of highly pure materials and further treatments. Semiconductor Devices-p-n junction diode.

Polymer
Nomenclature, functionality, classification, methods of polymerization, mechanism of polymerization, molecular weight determination-Viscometry, light scattering methods. Plastics-Moulding constituents of a plastics and moulding of plastics into articles. Important thermoplastics and thermosetting resins- synthesis & applications of PVA,
FLUON, PC, Kevlar, ABS polymer, phenolic & amino resins, epoxy resins and polyurethanes. Conductive polymers.

**Outcome**

Students would become familiar with the important practical applications of electrochemistry, solids, their properties and applications, and the polymer materials.

**Text Books**


**Reference Books**

Objectives To introduce the students to basic principles of electrochemistry, cell construction and evaluation, corrosion, adsorption, phase equilibrium and engineering materials of importance

Electrochemistry
Conductivity of electrolytes- Specific, molar and equivalent conductivity, Nernst equation for electrode potential, EMF series, hydrogen electrode, calomel electrode, glass electrode, Electrolytic and galvanic cells, cell EMF, its measurement and applications, Weston standard cell, reversible and irreversible cells, concentration cell, electrode (hydrogen gas electrode) and electrolyte concentration cell, concentration cell with and without transference, fuel cells, hydrox fuel cell.

Corrosion
Dry corrosion and wet corrosion, mechanisms, types of corrosion, DMC, DAC, stress, intergranular, atmospheric and soil corrosion, Passivity, Polarization, over potential and its significance, Factors affecting corrosion, protection from corrosion by metallic coatings, electroplating, electroless plating and cathodic protection, Chemical conversion coatings and organic coatings- Paints, enamels.

Surface Chemistry

Engineering Materials
**Polymers and Composites**

Concept of macromolecules-Nomenclature of polymers-Tacticity- Polymerization processes- Mechanism-Types of Polymerization-Classification of Polymers-Effect of Polymer structure on properties-Moulding of plastics into articles-Important addition and condensation polymers –synthesis and properties – Molecular mass determination of polymers- Static and dynamic methods, Light scattering and Gel Permeation Chromatography-Rubbers –Vulcanization – Synthetic rubbers – Conducting polymers-Composite materials – Reinforced composites and processing.

**Outcome**

Students would have learnt the significance of electrochemistry and its application, corrosion, adsorption, engineering materials of importance and polymer.

**Text Books**


**Reference Books**

Objectives
To introduce the students to basic principles of electrochemistry, importance of corrosion, spectroscopic techniques, metals, alloys polymers and composites.

Electrochemistry
Conductivity of electrolytes- Specific, molar and equivalent conductivity, Nernst equation for electrode potential, EMF series, hydrogen electrode, calomel electrode, glass electrode, Electrolytic and galvanic cells, cell EMF, its measurement and applications, Weston standard cell, reversible and irreversible cells, concentration cell, electrode (hydrogen gas electrode) and electrolyte concentration cell, concentration cell with and without transference, fuel cells, hydrox fuel cell.

Corrosion
Dry corrosion and wet corrosion, mechanisms, types of corrosion, DMC, DAC, stress, inter granular, atmospheric and soil corrosion, Passivity, Polarization, over potential and its significance, Factors affecting corrosion, protection from corrosion by metallic coatings, electroplating, electroless plating and cathodic protection, Chemical conversion coatings and organic coatings- Paints, enamels.

Spectroscopic Techniques

Metals and Alloys
Polymers and Composites
Concept of macromolecules-Nomenclature of polymers-Tacticity- Polymerization processes- Mechanism-Types of Polymerization-Classification of Polymers-Effect of Polymer structure on properties-Moulding of plastics into articles-Important addition and condensation polymers –synthesis and properties – Molecular mass determination of polymers- Static and dynamic methods, Light scattering and Gel Permeation Chromatography-Rubbers –Vulcanization – Synthetic rubbers – Conducting polymers- Composite materials – Reinforced composites and processing.

Outcome
Students would become familiar with the importance of electrochemistry, its applications, corrosion, spectroscopic techniques for characterization, importance of properties of metals, alloys polymers and composites.

Text Books

Reference Books

Laboratory Experiments (for all Branches)
1. Corrosion rate by polarization technique
2. Conductometric titration
3. Potentiometric titration
4. pH metric titration
5. Percentage purity of bleaching powder
6. Percentage purity of washing soda
7. Determination of molecular weight of polymer by viscometry
8. Demonstration of sophisticated instruments and assignments on them

Reference Books
1. Laboratory Manual, Department of Chemistry, NITT
BE I 102 BASIC CIVIL ENGINEERING
(for Chemical, CSE, ECE, EEE, ICE, Mechanical, MME, Production)

Objectives
1. To give an overview of the fundamentals of the Civil Engineering fields to the students of all branches of Engineering
2. To realize the importance of the Civil Engineering Profession in fulfilling societal needs

Syllabus
Properties and uses of construction materials - stones, bricks, cement, concrete and steel.
Site selection for buildings - Component of building - Foundation- Shallow and deep foundations - Brick and stone masonry - Plastering - Lintels, beams and columns - Roofs.
Surveying -Classification-Chain Survey-Ranging-Compass Survey-exhibition of different survey equipment.
Sources of Water - Dams- Water Supply-Quality of Water-Wastewater Treatment – Sea Water Intrusion – Recharge of Ground Water.

Outcome
1. The students will gain knowledge on site selection, construction materials, components of buildings, roads and water resources
2. A basic appreciation of multidisciplinary approach when involved in Civil Related Projects.

Reference Books
5. Lecture notes prepared by Department of Civil Engineering, NITT.
Objectives
To explain the importance of concepts of mechanical engineering and conservation equations.
To introduce the techniques for analyzing the forces, momentum and power.
To introduce the various properties of materials, and the techniques of selection of materials.
To identify the basic elements of a mechanical system and write their constitutive equations and performance analysis techniques.

Fundamentals
Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering, and manufacturing technology.

Thermal Engineering
Laws of thermodynamics, types of systems, concepts and types of I.C. engine, air compressors, principle of turbomachines, properties of steam and steam generators, automobile engineering, introduction to gas turbines and refrigeration & air-conditioning.

Engineering Materials
Types of materials, selection of materials, material properties, introduction to materials structure, machine elements, transmission, fasteners, and support systems.

Manufacturing Technology
Manufacturing, classification, lathe, drilling machines, milling machines, metal joining, metal forming, casting, forging, and introduction to powder metallurgy.

Outcome
The terminal objectives of the course is that, on successful completion of teaching-learning and evaluation activities, a student would be able to identify, appreciate and analyze the problems by applying the fundamentals of mechanical engineering and to proceed for the development of the mechanical systems.

Reference Books
1. Lecture notes prepared by Department of Mechanical Engineering, NITT.
2. K. Venugopal, Basic mechanical Engineering
BE III 102 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
(for Chemical, Civil, Mechanical, MME and Production)

Objectives This course aims to equip the students with a basic understanding of Electrical circuits and machines for specific types of applications. The course gives a comprehensive exposure to house wiring. This course also equips students with an ability to understand basics analog and digital electronics.

DC & AC Circuits: Current, voltage, power, Kirchhoff's Laws - circuit elements R, L and C, phasor diagram, impedance, real and reactive power in single phase circuits.

DC & AC Machines: DC Motor, Induction motor, Synchronous motor, Synchronous generator and Transformers- construction, principle of operation, types and applications.

House wiring & safety: Single phase and three phase system – phase, neutral and earth, basic house wiring - tools and components, different types of wiring – staircase, florescent lamp and ceiling fan, basic safety measures at home and industry.

Analog Electronics: semiconductor devices – p-n junction diode, Zener diode, BJT, operational amplifier – principle of operation and applications – Introduction to UPS.

Digital Electronics: Introduction to numbers systems, basic Boolean laws, reduction of Boolean expressions and implementation with logic gates.

Outcome The students shall develop an intuitive understanding of the circuit analysis, basic concepts of electrical machines, house wiring and basics of electronics and be able to apply them in practical situation.

Text Books

Reference Books
BS 102 BRANCH SPECIFIC COURSES  
BS 102 (CL) INTRODUCTION TO CHEMICAL ENGINEERING

Objectives
To give a comprehensive knowledge on various aspects practiced in chemical engineering and the sources of information on related topics.


Outcome
The student will be able to appreciate various processes followed in transforming raw material into value added materials, significance of chemical engineering to the society in the areas of Health, Energy, Environment and Food.

Reference Books
Objective
To give an overall exposure of the field of Civil Engineering and the role of Civil Engineers to the Civil Engineering students.

Syllabus
Role of Civil engineers in society, Ethics in Civil Engineering Practice, outstanding accomplishments of the profession, future trends, Types of projects, stages of projects, Specifications and Scope.
State of the art lectures on Structures, Transportation, Water Resources, Environment, Geotechnical and GIS / GPS / RS. Introduction to geology.
Properties and uses of construction materials such as stones, bricks, cement, concrete and steel.

Outcome
At the end of the course, the students will have a broad understanding of the State of the art in various disciplines of Civil Engineering. They are also introduced to the fundamentals of buildings and construction materials.

Textbooks

Reference books
3. Lecture Notes Prepared by Civil Engineering Department, NIT-T.
BS 102(CS) INTRODUCTION TO COMPUTER SCIENCE AND ENGINEERING

Objectives

To introduce
The basic concepts in Computer Science and Engineering.
The different styles of programming.
Important features of programming languages.

Syllabus

Basic model of computation. principle of mathematical induction, notions of algorithms and programming, iteration and recursion.

Imperative style of programming, Functional style of programming, correctness and efficiency.

Features of block-structured languages, Functions and Procedures, parameter passing, Top-down style and step-wise refinement with concrete examples.

Outcomes

Students will be able to,

Compare different styles of programming languages.
Write algorithms for any given problem.
Analyze the correctness of the algorithm.

Text/Reference books

BS102 (EE) INTRODUCTION TO ELECTRICAL AND ELECTRONICS ENGINEERING

Objectives This course facilitates the students to get a comprehensive exposure to electrical and electronics engineering.

History, major inventions, Scope, significance and job opportunities in electrical and electronics engineering, brief overview of various energy resources.

Basics of energy conversion, power apparatus used in power generation, transmission and distribution, Power apparatus used in various industries.

Basic ideas about utility supply, electrical tariff, energy audit and importance of energy saving.

Introduction to different types of electrical circuits, house wiring, electronic circuits for signal processing, specifications of electronic components.

Brief overview of curriculum, laboratories and various software packages, electronic testing and measuring equipments.

Outcome The students shall develop an insightful knowledge on various fundamental elements of electrical and electronics engineering.

Reference Books

Objectives
This course would facilitate the learner to acquire good exposure to electronics and communication engineering.

History of major inventions in electronics and communication engineering, Industries and R&D institutions in India, Overview of various specializations in ECE, Overview of laboratories in ECE dept., Electronic test and measurement equipments, Specifications for electronic components, Mini projects, Technical report preparation and presentation.

Introduction to Circuit theory and analysis, Nodal analysis, Mesh analysis for DC and AC circuits, Network reduction-techniques and theorems.

Introduction to Signals and Systems

Basics of telecommunication infrastructure, Introduction to Mobile, Satellite and Microwave Communication systems, modulation techniques

Introduction to DC generators, motors, Inverters and Transformers

Outcome
The learners are expected to have an overview of electronics and communication engineering and learn the introductory concepts in each of the specializations in ECE.

Reference Books

1. Lecture notes prepared by Department of ECE, NITT
BS102 (IC) INSTRUMENTATION AND CONTROL ENGINEERING

Objectives
To introduce the students on the role of Instrumentation and Control engineering in the society.

Place of engineers in the society and in an industrial organization. The technical manpower pyramid. Introduction to the program, subjects of study and its relevance, Opportunities for training, placement and for higher studies.

Overview of industry and scope of the discipline - Preliminary project design requirements - Various process conditions. Knowing client requirement and collection of specific data for projects.

Objectives, general concepts, terminologies, types and basic block diagrams of Instrumentation system.Objectives, general concepts, terminologies, types and basic block diagrams of control systems.

Introduction to instrumentation and control engineering codes and standards and their relevance to industry.

Case studies: Introduction to instrumentation and control in a typical application like temperature, flow, or pressure control.

Outcome
1. Students will know what an engineer does for the benefit of society.
2. Role of instrumentation and control engineering in an industrial organization.
3. They will know instrumentation and control engineering in a device or a plant.
4. They will know standards used in instrumentation and control engineering.
5. They will know how to apply basic building blocks of instrumentation and control engineering for a typical application.

Text Books

References Books
1. ISA standards
2. Bureau of Indian standards
Introduction to Mechanical Engineering

Objective: To give an introduction of mechanical engineering to the students to kindle interest in mechanical engineering branch.

Concept of living needs of individual and social, basic needs of a society - food, shelter, governance, security, commerce, health care education, energy, entertainment, clothing, transport, communication. Role of mechanical engineers in fulfilling these needs.

Detailed look into the following of social needs:
(i) Energy: microscopic and macroscopic forms of energy, energy conversion devices, Carnot’s limitation, IC engines.
(ii) Transportation: Comparison of cost of various modes of transportation, basics of rolling friction, comparison of roller friction and sliding friction, Theory of wheel and axle.

Introduction to working of some basic mechanical devices like air-conditioners, bicycle free wheel bicycle pump, turbo machines.

Introduction to various types of materials: metal polymer ceramic composites and their properties, performs.

Introduction to manufacturing processes: casting, forming, machining, and joining.

Interdisciplinary engineering systems.

Intellectual property rights: patents, copy rights, trade mark design registration and geographical indication.

Expected learning outcome: The student after undergoing this course will know the concept of social living basic needs of the society, the role of mechanical engineers in fulfilling the needs of the society, materials, basic manufacturing process, and various mechanical systems.

Text Books
1. Lecture notes prepared by Department of Mechanical Engineering, NITT.

Reference Books
BS 102 (MT) INTRODUCTION TO METALLURGICAL AND MATERIALS ENGINEERING

Objectives
To develop an understanding of the basic knowledge of Metallurgical and Materials Engineering and gain knowledge on overview of developments in the field of materials over periods

Historical perspective, scope of materials science and of materials engineering – Role of metals in civilization and in wars – rise and fall of emperors who conquered world-Metallurgy and materials of India – Damascus sword – Delhi iron Pillar etc.

Metals and Materials – Classification – Properties – Mechanical, electrical, thermal, magnetic, optical, decorative and its applications. Illustrative examples of practical uses of materials.

Modern materials – Bio and Nano materials.

Role of metals and materials in aerospace and telecommunication, Role of metals and materials in Indian medicines – Siddha, Ayurveda, etc.

Metallurgical Industries in India

Outcome
C1. Define engineering materials technology and understand each stage of the materials cycle, material selection criteria [d,f,h,l,k]
C2. Understand professional and ethical responsibilities of Metallurgical and Materials professional [f]
C3. Understand the impact of Metallurgical and Materials Engineering solutions in a global, economic, environmental, and societal context [h]
C4. Select different metallic materials for specific engineering applications [l,k]

Text Books
BS102 (PR) INTRODUCTION TO PRODUCTION ENGINEERING

Objectives
To introduce the scope of Production Engineering and its relevance to industries.

Role of Production Engineer, Introduction to Manufacturing Processes – Casting, Welding, Metal Forming, Machining, Powder Metallurgy, Advanced Manufacturing Processes.


Introduction to Metrology and Quality Control, Total Quality Management (TQM), Material Handling, Reliability and Maintenance, Productivity, Industrial Safety.

Introduction to Engineering Economy and Costing, Work System Design, Facility Design, Production Planning and Inventory Control.

Introduction to Operation Research, Quality Management, Management Information System (MIS), Intellectual Property Rights (IPR), Supply Chain Management (SCM), Computer Aided Manufacturing (CAM), Computer Integrated Manufacturing (CIM). Introduction to Theory of Machines.

Outcome
The students will have knowledge in the broad spectrum of Production Engineering.

Text Books

Reference Books