With effect from 02/08/2016

JAWAHRLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech COURSE STRUCTURE (2016-17)
(Common for EEE, ECE, CSE, EIE, BME, IT, ETE, ECM, ICE)

I YEAR I SEMESTER

<table>
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<th>S. No</th>
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I YEAR II SEMESTER

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* Mandatory Course.
MATHEMATICS-I
(Linear Algebra and Differential Equations)

B.Tech. I Year I Sem.
Course Code: MA101BS

Prerequisites: Foundation course (No prerequisites).

Course Objectives:
To learn
- types of matrices and their properties
- the concept of rank of a matrix and applying the same to understand the consistency
- solving the linear systems
- the concepts of eigen values and eigen vectors and reducing the quadratic forms into their canonical forms
- partial differentiation, concept of total derivative
- finding maxima and minima of functions of two variables
- methods of solving the linear differential equations of first and higher order
- the applications of the differential equations
- formation of the partial differential equations and solving the first order equations.

Course Outcomes:
After learning the contents of this paper the student must be able to
- write the matrix representation of a set of linear equations and to analyze the solution of the system of equations
- find the Eigen values and Eigen vectors which come across under linear transformations
- find the extreme values of functions of two variables with/without constraints.
- identify whether the given first order DE is exact or not
- solve higher order DE’s and apply them for solving some real world problems

UNIT-I
Initial Value Problems and Applications

Exact differential equations - Reducible to exact.

Linear differential equations of higher order with constant coefficients: Non homogeneous terms with RHS term of the type \( e^{ax} \), \( \sin ax \), \( \cos ax \), polynomials in \( x \), \( e^{ax} V(x) \), \( xV(x) \)-Operator form of the differential equation, finding particular integral using inverse operator, Wronskian of functions, method of variation of parameters.

Applications: Newton’s law of cooling, law of natural growth and decay, Orthogonal trajectories, Electrical circuits.

UNIT-II
Linear Systems of Equations

UNIT-III

Eigen values, Eigen Vectors and Quadratic Forms

Eigen values, Eigen vectors and their properties, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem, Diagonalization, Quadratic forms, Reduction of Quadratic forms into their canonical form, rank and nature of the Quadratic forms – Index and signature.

UNIT-IV

Partial Differentiation

Introduction of partial differentiation, homogeneous function, Euler's theorem, total derivative, Chain rule, Taylor's and Mclaurin's series expansion of functions of two variables, functional dependence, Jacobian.

Applications: maxima and minima of functions of two variables without constraints and Lagrange's method (with constraints)

UNIT-V

First Order Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, Lagrange's method to solve the first order linear equations and the standard type methods to solve the non linear equations.

Text Books:

1. A first course in differential equations with modeling applications by Dennis G. Zill, Cengage Learning publishers.

References:

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons Publisher.
ENGINEERING CHEMISTRY

B.Tech. I Year I Sem. Course Code: CH102BS/CH202BS

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4 0/0/0 4

Course Objectives:

1) To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2) To include the importance of water in industrial usage, significance of corrosion control to protect the structures, polymers and their controlled usage.
3) To acquire knowledge of engineering materials and about fuels and batteries.
4) To acquire required knowledge about engineering materials like cement, refractories and composites.

Course Outcomes:

Students will gain the basic knowledge of electrochemical procedures related to corrosion and its control. They can understand the basic properties of water and its usage in domestic and industrial purposes. They learn the use of fundamental principles to make predictions about the general properties of materials. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT-I


Boiler troubles:


UNIT-II

Electrochemistry and Batteries:


Batteries: Cell and battery - Primary battery (dry cell, alkaline cell and Lithium cell) and Secondary battery (lead acid, Ni-Cd and lithium ion cell).

UNIT-III

**Polymers**: Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples.

**Plastics**: Definition and characteristics- thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and engineering applications of PVC and Bakelite.

**Fibers**: Characteristics of fibers – preparation, properties and applications of Nylon-6, 6 and Dacron. Fiber reinforced plastics (FRP) – Applications.

**Rubbers**: Natural rubber and its vulcanization - compounding of rubber.

**Elastomers**: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

**Conducting polymers**: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers**: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT-IV


**Combustion**: Definition, Calorific value of fuel – HCV, LCV; Calculation of air quantity required for combustion of a fuel.

UNIT-V

**Cement, Refractories, Lubricants and Composites**:

**Cement**: Portland cement, its composition, setting and hardening of Portland cement.

**Special cements**: White cement, water proof cement, High alumina cement and Acid resistant cement.

**Refractories**: Classification, characteristics of good refractories, Refractoriness, refractoriness under load, porosity and chemical inertness – applications of refractories.

**Lubricants**: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Composites**: Introduction- Constituents of composites – advantages, classification and constituents of composites. Applications of composites.

**Text books**:


Reference Books:

ENGLISH PHYSICS/ENGINEERING PHYSICS - I

B.Tech. I Year I Sem.                          L  T/P/D  C
Course Code: PH103BS                          3  0/0/0  3

Course Objectives:
- To understand interaction of light with matter through interference, diffraction and polarization.
- To able to distinguish ordinary light with a laser light and to realize propagation of light through optical fibers.
- To understand various crystal systems and there structures elaborately.
- To study various crystal imperfections and probing methods like X-RD.

Course outcomes: after completion of this course the student is able to
- Realize the importance of light phenomena in thin films and resolution.
- Learn principle, working of various laser systems and light propagation through optical fibers.
- Distinguish various crystal systems and understand atomic packing factor.
- Know the various defects in crystals.

UNIT-I

Interference: Coherence, division of amplitude and division of wave front, interference in thin films (transmitted and reflected light), Newton's rings experiment.

Diffraction: Distinction between Fresnel and Fraunhofer diffraction, diffraction due to single slit, N-slits, Diffraction grating experiment.

UNIT-II

Polarization: Introduction, Malus's law, double refraction, Nicol prism, Quarter wave and half wave plates.

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, Einstein coefficients, population inversion, ruby laser, helium – neon laser, semi conductor laser, applications of lasers

UNIT-III

Fiber Optics: Principle of optical fiber, construction of fiber, acceptance angle and acceptance cone, numerical aperture, types of optical fibers: step index and graded index fibers, attenuation in optical fibers, applications of optical fibers in medicine and sensors.

UNIT-IV

Crystallography: Space lattice, unit cell and lattice parameters, crystal systems, Bravais lattices, atomic radius, co-ordination number and packing factor of SC, BCC, FCC, HCP and diamond, Miller indices, crystal planes and directions, inter planar spacing of orthogonal crystal systems.

UNIT-V

X-ray Diffraction and Defects in Crystals: Bragg’s law, X-ray diffraction methods: Laue method, powder method; point defects: vacancies, substitutional, interstitial, Frenkel and
Schottky defects, line defects (qualitative) and Burger’s vector, surface defects: stacking faults, twin, tilt and grain boundaries.

**Text Books:**

**Reference Books:**
PROFESSIONAL COMMUNICATION IN ENGLISH

B.Tech. I Year I Sem.
Course Code: EN104HS/EN204HS

L T/P/D C
3 0/0/0 3

WILL BE UPLOADED TOMORROW
ENGINEERING MECHANICS

B.Tech. I Year I Sem.  L  T/P/D C
Course Code: ME105ES  3  0/0/0  3

Pre Requisites: None

Course Objectives:
- To understand the resolving forces and moments for a given force system
- To analyze the types of friction for moving bodies and problems related to friction.
- To determine the centroid and second moment of area

UNIT-I

UNIT-II

UNIT-III
Centroid and Center of Gravity: Introduction – Centroids of lines – Centroids of area - Centroids of Composite figures - Theorem of Pappus - Centre of Gravity of Bodies – Centroids of Volumes – Center of gravity of composite bodies.


UNIT-IV

Virtual Work: Theory of virtual work - Application.

UNIT-V

Mechanical Vibrations: Definitions, Concepts-Simple Harmonic motion- free vibrations- Simple and compound pendulums

Text Books:

References:
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

B.Tech. I Year I Sem.
Course Code: EE106ES/EE205ES:

Pre-requisite: None

Objectives: Objectives of this course are

- To introduce the concept of electrical circuits and its components
- To introduce the concepts of diodes and transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

OUTCOMES: After this course, the student will be able

- To analyze and solve problems of electrical circuits using network laws and theorems.
- To identify and characterize diodes and various types of transistors.

UNIT- I

Electrical Circuits: R-L-C Parameters, Voltage and Current, Independent and Dependent Sources, Source Transformation – V-I relationship for passive elements, Kirchoff's Laws, Network reduction techniques – series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis,

Single Phase AC Circuits: R.M.S. and Average values, Form Factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance – phase and phase difference, Concept of power factor, j-notation, complex and polar forms of representation.

UNIT-II

Resonance: Series resonance and Parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for Various Parameters.

Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Superposition, Reciprocity, Tellegen's, Millman's and Compensation theorems for DC and AC excitations.

UNIT- III

P-N Junction Diode: Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

UNIT- IV


Transistor Biasing And Stabilization - Operating point, DC and AC load lines, Biasing - Fixed Bias, Emitter Feedback Bias, Collector to Emitter feedback bias, Voltage divider bias, Bias
stability, Stabilization against variations in $V_{BE}$ and $\beta$, Bias Compensation using Diodes and Transistors.

**Transistor Configurations:** BJT modeling, Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters, Comparison of CE, CB and CC configurations.

**UNIT-V**

**Junction Field Effect Transistor:** Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, Small Signal Model, Biasing FET.

**Special Purpose Devices:** Breakdown Mechanisms in Semi-Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR.

**Text books:**

1) Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2) Basic Electrical and electronics Engineering-D P Kothari, I J Nagarath Mc Graw Hill Education

**References:**

6) Network Theory by Suchakar, Shyam Mohan Palli, TMH.
ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB

B.Tech. I Year I Sem.  
Course Code: EN107HS/EN207HS

WILL BE UPLOADED TOMORROW
ENGINEERING WORKSHOP

B.Tech. I Year I Sem.
Course Code: ME108ES/ME208ES

Pre-requisites: Practical skill

Course Objective:
- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes: At the end of the course, the student will be able to:
- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

1. TRADES FOR EXERCISES:
At least two exercises from each trade:
1) Carpentry
2) Fitting
3) Tin-Smithy and Development of jobs carried out and soldering.
4) Black Smithy
5) House-wiring
6) Foundry
7) Welding
8) Power tools in construction, wood working, electrical engineering and mechanical Engineering.

2. TRADES FOR DEMONSTRATION and EXPOSURE:
- Plumbing, Machine Shop, Metal Cutting (Water Plasma)

Text books:
1) Workshop Practice /B. L. Juneja / Cengage

Reference books:
2) Workshop Manual / Venkat Reddy/ BSP