GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. FIRST YEAR SYLLABUS

GROUP 1

ENGINEERING BRANCHES

Electronics and Communication Engineering

Mechanical Engineering

Civil Engineering

Name: ______________________________

Branch: ____________________________

ID. No.: ____________________________
### Group 1 - Semester I

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subjects</th>
<th>Subject Code</th>
<th>Teaching Scheme</th>
<th>Theory</th>
<th>Tutorial</th>
<th>Practical</th>
<th>Credits</th>
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### Academic Calendar for Semester – I

- **Academic Term:** 28/07/2008 to 25/10/2008
  - 10/11/2008 to 22/11/2008
- **Diwali Vacation:** 26/10/2008 to 9/11/2008
- **Mid Semester Exam:** 22/9/2008 to 29/9/2008
- **End Semester Exam:** 15th December onwards.
Semester – I - Mathematics-I

• Review of limits, continuity, and differentiability.
• Mean value theorem, Taylors Theorem, Maxima and Minima.
• Riemann integrals, Fundamental theorem of Calculus, Improper integrals, applications to area, volume.
• Convergence of sequences and series, power series.
• Partial Derivatives, gradient and directional derivatives, chain rule, maxima and minima, Lagrange multipliers.
• Double and Triple integration, Jacobians and change of variables formula.
• Parametrization of curves and surfaces, vector Fields, line and surface integrals.
• Divergence and curl, Theorems of Green, Gauss, and Stokes.

Texts/References

Semester – I - Physics


2) **Ultrasonic:** Introduction, production, properties and detection of ultrasonics, Determination of velocity and application of ultrasonic in Engineering.

3) **Crystal Physics:** Introduction and classification of solids-crystal structure – The crystal systems and Bravias Lattice – Space Lattices of cubic systems – Miller Indices – Relation between Interplanner Distance and cubic Edge and Laws Formula.

4) **Band theory of Solids:** Based theory of Solids – Classification of solids – Energy band structure of conductors, insulator and semi conductions types of diodes, simple diode, Zener diode, varactor diode, LED Solar cells, photovoltaic cell, Photo Conductivity, Hall effects.


6) **Optical – Fibre Communication:** Introduction – Fibre – Optic System – advantages of Fibre optics – Basic principle – Acceptance angle and Numerical Aperture – Types of optics preparation through optical fibre


8) **Super Conducting Materials:** Introduction to super conductor – properties of super conductor Type I and Type II super conductor – Comparision between I and II – High T conductors – Application


**Reference Books:**
1) Engineering Physics K. Rajagopal Prentice-Hall of India Pvt. Ltd., New Delhi
1. **Introduction:** Scalar and Vector Quantities, composition and resolution of vectors, system of units, definition of space, time, particle, rigid body, force.

2. **Fundamentals of Statics:** Principles of statics, coplanar, concurrent and non-concurrent, parallel and non-parallel forces, composition and resolution of forces, moments & couples - their properties, combination of coplanar couples and forces, equilibrant, equilibrium, free body diagrams, analytical conditions of equilibrium for coplanar force systems.

3. **Truss:** Simple determinate plane trusses and analysis for member forces using methods of joints and methods of sections.

4. **Distributed forces, center of gravity and moment of inertia:** Center of gravity of lines, plane areas, volumes and bodies, Pappus – Guldinus theorems, moment of inertia, polar moment of inertia & radius of gyration of areas, parallel & perpendicular axes theorems.

5. **Friction:** Theory of friction, static and sliding friction, laws of friction, angle and coefficient of friction, inclined plane friction, ladder friction, wedges, belt and rope friction.

6. **Simple Machines:** Velocity ratio, mechanical advantage, efficiency, reversibility of machines, simple machines such as levers, pulley and pulley blocks, wheel and differential axle, Single purchase/double purchase crab, compound screw jacks.

7. **Physical & Mechanical properties of structural materials:** Properties related to axial, bending, and torsional & shear loading, Toughness, hardness, proof stress, factor of safety, working stress, load factor.

8. **Simple stresses & strains:** Elastic, homogeneous, isotropic materials; limits of elasticity and proportionality, yield limit, ultimate strength, strain hardening, section of composite materials, prismatic and non-prismatic sections.

   Strains: Linear, shear, lateral, thermal and volumetric, Poisson’s ratio. Stresses: Normal stresses, axial – tensile & compressive, shear and complementary shear, thermal and hoop. Applications to composite material stepped & tapered bars.

9. **Beam:**

   (a) Types of loads, Types of supports, Types of beams, Support reactions for statically determinate beams
   (b) Bending moment and Shear force , Bending moment and shear force diagrams for statically determinate beams subjected to couples, concentrated forces, uniformly distributed loadings, relation between bending moment, shear force and rate of loading, point of contraflexure.

10. **Stresses in beams:** Theory of simple bending, bending stresses and their distribution, moment of resistance, modulus of sections, distribution of shear stresses in different sections.

11. **Principal stresses and strains:** Compound stresses, analysis of principal planes and principal stresses, principal strains, angle of obliquity of resultant stress, principal stresses in beams.

**BOOKS:**
1. Engineering Mechanics (Statics) Beer and Johnston
1 **Introduction to Computer & Programming:** Introduction, Basic block Diagram and functions of various components of computer. Concept of Hardware and Software. Concept of basic types of software. Introduction to programming and programming languages. Flow charts and algorithms.

2 **Introduction to C Language:**
   1 **Fundamentals of ‘C’:** Data types in ‘C’. Operators and their hierarchy, Concept of header files, I/O functions, control structures in C, looping structures in C, arrays and strings.
   2 **Functions and recursion:** Concepts of functions with various types of parameters. Various types of parameter passing mechanisms. Recursive functions and implementation of these concepts in ‘C’.
   3 **Pointers and structures:** Concepts of pointers and simple programs using pointers. Introduction to simple structure and its implementations.

3 **Introduction to C++ language**
   1 Principles of object oriented programming, Comparison with procedural languages, Tokens, expressions and control structures

   2 **Introduction to functions, classes, objects, constructors, destructors in C++**. Classes and Objects: Declaring classes, defining member functions, Making an outside function inline, nesting of member functions, private member functions, Arrays with in a class, Memory allocation of objects, static data members, static member functions, arrays of objects, objects as function arguments, friend function, returning of objects, const member function.

**Text books:**
2. Object oriented programming with C++, 3rd edition Author: Balagurusamy E Publisher: Tata McGraw-Hill Publishing Company limited
Semester – I - Elements of Mechanical Engineering


II Fuels and Combustion: Introduction, Classification, Solid fuels, Liquid Fuels, Gaseous fuels, LPG, CNG and biofuels, Calorific values.

III Properties of gases: Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Internal energy, Relation between Cp and Cv, Enthalpy, Non flow process, Constant volume process, Constant pressure process, Isothermal process, Poly-tropic process, Adiabatic process.


VII Internal Combustion Engines: Introduction, Classification, Engine details, Otto four-stroke cycle, Diesel-four-stroke cycle, Difference between Otto cycle and Diesel cycle, Two-stroke cycle, Difference between two-stroke and four-stroke cycle, indicated power (ip), Brake Power (bp), Efficiencies.


IX Pumps: Introduction, Reciprocating pump, types and operation, Bucket pump, Air Chamber, Centrifugal pumps, Types and Priming, Rotary pumps.

X Air Compressors: Introduction, Uses of Compressed air, Reciprocating compressors, Operation of a compressor, Work for compression, Power required, Reciprocating compressor efficiency, Multistage reciprocating compressors, Rotary compressors.

XI Refrigeration & Air Conditioning: Introduction, Refrigerant, Types of refrigerators, Vapour compression refrigerating system, Window and split air conditioners.

XII Couplings, Clutches and Brakes: Introduction, Couplings, Clutches, Brakes, Types of brakes. Difference between a brake and a clutch.

XIII Transmission of Motion and Power: Introduction, Methods of drive, Power transmission elements, shaft and axle, Belt-drive, Pulleys, Power transmitted by a belt, Chain drive, Friction drive, Gear drive

XIV Important Engineering Materials: Properties of materials, Ferrous & Nonferrous materials and other important engineering materials such as Timber, Abrasive material, silica, ceramics, glass, graphite, diamond, plastic, polymer and composite material

Reference Books:
II Introduction to Engineering Materials by B.K. Agrawal Tata Mcgrahill Publication New Delhi
III Thermal Science and Engineering by Dr. D.S. Kumar, S.K. Kataria & sons Publication New Delhi
IV Fundamental of Mechanical Engineering by G.S. Sawhney, Prentice Hall of India Publication New Delhi
V Thermal Engineering by R.K. Rajput, S.Chand Publication New Delhi
**Semester – I - Workshop**

**Objectives:** Exposure to Industrial environment, work culture, hand tools and general purpose machine. Developing Creativity, Craft man skill, approach to work and Planning capability

**Syllabus:**

**Making Jobs** in Fitting, Carpentry, Smithy, Tin smithy and Welding shops

**Journal is to be prepared** covering the topics of demonstration and Report about Process / Methodology / Inspection for making jobs.

**Text Books & Reference Books:**
Semester – II - Mathematics-II

- Vectors in Rn, notion of linear independence and dependence, linear span of a set of vectors, vector subspaces of Rn, basis of a vector subspace.
- Systems of linear equations, matrices and Gauss elimination, row space, null space, and column space, rank of a matrix.
- Determinants and rank of a matrix in terms of determinants.
- Abstract vector spaces, linear transformations, matrix of a linear transformation, change of basis and similarity, rank-nullity theorem.
- Inner product spaces, Gram-Schmidt process, orthonormal bases, projections and least squares approximation.
- Eigenvalues and eigenvectors, characteristic polynomials, eigenvalues of special matrices (orthogonal, unitary, hermitian, symmetric, skewsymmetric, normal). algebraic and geometric multiplicity, diagonalization by similarity transformations, spectral theorem for real symmetric matrices, application to quadratic forms.

Texts/References
I Scope of Civil Engineering


II Surveying

Introduction: Surveying and levelling, Object and uses, Primary divisions, Fundamental principles, Classification of surveying, Plans and maps, Scales, Units of measure.

Linear measurements: Methods, Instruments used in chaining; Chain surveying, Ranging; Obstacles; Errors in chaining, Tape corrections, Conventional symbols

Compass surveying: Types and uses of compass, Bearings, Whole Circle Bearings, and Reduced Bearings, Computation of angles; Meridians; declinations and dip of needle; Local attraction; Chain and compass surveying field work.

Elevation measurements: Levelling, object and uses, terms used in levelling, leveling instruments, methods of levelling, recording and methods of reducing, errors in levelling, contours; characteristics and applications.

Areas and volumes: use of a Planimeter.


III Construction Materials


IV Elements of Building Construction

Planning: Elementary principles and basic requirements of a building planning, layout of residential & industrial buildings.


V Water Resources Development


VI Transportation Engineering

Role of Transportation in National development, Transportation Ways, Surface Transportation and Aviation, Elements of Highway materials properties and highway construction, BOT Projects for Highways, Elements of Traffic Engineering and Traffic Control.

Reference Books:

1) Title :Surveying Vol .I & II Author: Dr. B. C. Punamia Publisher : Laxmi Publication Delhi
2) Title :Surveying Vol. I and II Author : S. K. Duggal Publisher : Tata Macgraw hill Publication New Delhi
3) Title: Civil Engg. Drawing Author : S. C. Rangwala Publisher: Charotar Pub. House Anand
4) Title : Building Construction Author : Dr. B. C. Punamia Publisher: Laxmi Pub. Delhi
5) Title : Engineering Material Author : Dr. S.C. Rangwala Publisher: Charotar Pub. House
6) Title : Building Materials Author: Dr. S. .K. Duggal Publisher : New Age International Pub.House Delhi
7) Title : Civil Engineering Material Author : Jakson and Dhir Publisher : ELBS Publishing London
8) Title : Civil Engineering Material Author : Jakson and Dhir Publisher : ELBS Publishing London
9) Title : Highway Engineering Author: Khanna S. K. and Justo C. E.G. Publisher : Nemchand and Brothers
10 ) Title : Irrigation Engineering and Hydraulic Structures Author : Santoshkumar Garg Publisher : Khanna Publishers Delhi
Semester – II - Elements of Electrical Engineering

I D.C. Circuits:- Effect Of Temperature Upon Resistance, Solutions Of series, parallel in brief, star-delta combination of Resistances, KVL & KCL.


IV Single Phase A.C. Circuits:- Generation Of Alternating Voltages & Currents, Their Equations, Definitions, R.M.S. And Average Values, Vector Representation Of Alternating Quantities, Addition And Subtraction Of Vectors, Complex Algebra., Phasor Relations Between Voltage And Current In Each Of Resistance, Inductance And Capacitance, A.C. Series And Parallel Circuits, Power And Power Factor, Methods Of Circuit Solution (Analytically & Vectorially), Resonance In Series And Parallel Circuits.

V Polyphase Circuits:- Generation Of Polyphase Voltages, 3,Phase System, Phase Sequence, Inter Connection Of 3 Phases, Voltage, Current And Power Relationships In Balanced Three Phase Circuits, Power Measurement In Single Phase And 3 Phase Circuits.

VI Batteries, Cables:- Battery, life of batteries, charging & discharging of battery. Cables, 2, 21/2, 3 and 4 core armored & unarmored cables.

VII Electrical Wiring:- Connectors & switches, system of wiring, domestic wiring installation, sub circuits in domestic wiring, simple control circuit in domestic installation, industrial electrification.

VIII Illumination:- Types of lamps, fixtures & reflectors, illumination schemes for domestic, industrial & commercial premises, Lumen requirements for different categories.

IX Safety & protection:- Safety, electric shock, first aid for electric shock other hazards of electrical laboratories & safety rules, use of multimeters, grounding, importance of grounding, equipment of grounding for safety. Circuit protection devices, fuses, MCB, ELCB & relays.

Reference Books:
I Electrical Technology Vol.1 By B.L.Theraja
II Basic Electrical Engineering By V.N.Mittal
III Electrical Estimating & costing by Surjitsingh (Dhanpat Rai & Co.)
Semester – II - Engineering Graphics

1. **Introduction to Engineering** Graphics, Drawing instruments and accessories, BIS – SP 46. Use of plane scales and Representative Fraction.

2. **Engineering Curves:** Classification of Engineering Curves, Construction of Conics, Cycloidal Curves, Involute and Spirals.

3. **Loci of Points:** Path of the points moving on simple arrangements and simple mechanisms, slider crank mechanism, four bar chain mechanism etc.

4. **Projections of Points & Lines:** Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length of the line and its inclination with the reference planes.

5. **Projections of Planes:** Concept of different planes, Projections of planes with its inclination to one reference plane and with two reference planes. Concept of auxiliary plane method for projections of the plane.

6. **Projections of Solids & Section of Solids:** Classification of solids. Projections of solids like Cylinder, Cone, Pyramid and Prism with its inclination to one reference plane and with two reference planes. Section of such solids and the true shape of the section.

7. **Development of Lateral Surfaces:** Concept of development of the different surfaces. Parallel Line Development and Radial Line Development.

8. **Orthographic Projections:** Principle of projection, Principal planes of projection, Projections from the pictorial view of the object on the principal planes for View from Front, View from Top and View from Side using first angle projection method and third angle projection method, Full Sectional View.

9. **Isometric Projections and Isometric View or Drawing:** Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.

**NOTE:** Topic No.1, 8 and 9 of the above syllabus to be covered in Practical Hours.

**Text Books:**

**Reference Books:**
Semester – II - Environmental Studies

1. Introduction to Environment, Ecology and Ecosystem

Definition and Inter-relationships amongst and between them, Components of Environment, Relationship between different components, Man-Environment relationship, Impact of Technology on the environment, Environmental Degradation.

2 Ecology & Ecosystems


3 Population & Natural Resources


4 Environmental Pollution


REFERENCE BOOKS :
1 Environmental Studies: R. Rajagopalan,Oxford University Press
2 Environmental Pollution: Causes, Effects & Control by K.C Agrawal
3 Environmental Science by Richard T Wright & Bernard J Nebel
4 Environmental Science by Daniel B Botkin & Edward A Keller
5 Environmental Engineering & Management by Suresh K Dameja
6 Environmental Management by Dr. Swapan C Deb
7 Environment & Ecology by Dr Gourkrishna Dasmohapatra
8 Introduction To Environmental Engineering and Science by Master Gilbert M.
Semester – II - Communication Skills

Unit – 1 Communication skills Process, types and levels of communication, Technical Communication and General Communication. Factors to be considered in technical communication.

Unit – 2 Verbal and non-verbal communication (kinesics) Components of Non-verbal Communication (Kinesics), Barriers to effective communication. (Noise in oral and written communication) Communication across cultures.

Unit – 3 Listening skills - Types of Listening Active Listening V/s Passive Listening Empathetic Listening. Traits of a good listener, barriers in effective listening, Tips for effective listening.


Unit – 5 Interviews Introduction, General preparations for an interview, Types of questions generally asked at the interviews. Types of interviews, Importance of nonverbal aspects.

Unit – 6 Group Discussions Introduction, Group discussions as a part of the selection process, guidelines for group discussion. Role functions in group discussion.

Unit – 7 Paragraph Development Introduction, Topic sentence and supporting sentences. Attributes of a good paragraph. Types of paragraphs.


Unit – 9 Technical reports Introduction, types of reports, structure of reports, objectives and characteristics of reports.

Unit – 10 Technical Proposals Definition, Purpose, Types, Characteristics, Structure, Style and appearance.

Unit – 11 Technical Descriptions Introduction, Definition of an object or a process. Guidelines for writing good description - organization, content, structure.

Unit – 12 Effective Reading Skills Purpose of reading, skimming and scanning. Tips for improving comprehension skills.


Reference books:
1. Technical Communication Principles and Practice - Meenakshi Raman, Sangeeta Sharma (OUP)
2. Basic Communication Skills for Technology Andrea J. Rutherford (Pearson Education)
3. Communication Skills for Technical Students T.M. Farhathullah (Orient Longman)
4. A Textbook of English for Engineers and Technologists. Prepared by Humanities & Social Sciences Division. Anna University, Chennai. (Orient Longman)
5. Communication Skills for Engineers - Sunita Mishra, C, Murali Krishna (Pearson Education)