

Scheme of Instruction & Syllabi

Of

Bachelor of Technology (I Year) **(Common to all branches)**

Approved in Academic Council meeting held on 4th April 2011

Invertis Institute of Engineering & Technology

INVERTIS UNIVERSITY

Invertis Village
Bareilly-Lucknow NH-24, Bareilly

INVERTIS UNIVERSITY, BAREILLY

SCHEME OF INSTRUCTION

B. Tech. and Integrated M.Tech.or MBA First Year (common to all Courses)

I - YEAR , I-SEMESTER

S. No.	Course Code	SUBJECT	PERIODS			Credit
			L	T	P	
THEORY						
1	BAS-103	Mathematics-I	3	1	0	4
2	BAS-102 or BME-102	Engg. Chemistry or Engg. Mechanics	3	1	0	4
3	BEE-101 or BCS-101	Electrical Engg. or Computer Fundamentals & Programming in C	3	1	0	4
4	BEC-101 or BHU-101	Electronics Engineering or Professional Communication	3	1	0	4
5	BAS-101	Engg. Physics-I	3	1	0	4
6	BME-101 or BAS-104	Manufacturing Process or Environment & Ecology	2	0	0	2
PRACTICAL/TRAINING/PROJECT						
7	BME-151 or BCE-151	Workshop Practice or Engg. Drawing & Computer Graphics	0	1	3	2
8	BAS-152 or BME-152	Engg. Chemistry Lab or Engg. Mechanics Lab	0	0	2	1
9	BEE-151 or BCS-151	Electrical Engg Lab or Computer Fundamentals & Programming in C Lab	0	0	2	1
10	BAS-151 or BHU-151	Physics Lab or Professional Communication Lab	0	0	2	1
11	GP-101	General Proficiency	-	-	-	1
Total			17	6	9	28

INVERTIS UNIVERSITY, BAREILLY

SCHEME OF INSTRUCTION

B. Tech. and Integrated M.Tech.or MBA First Year (common to all Courses)

I - YEAR , II- SEMESTER

S. No.	Course Code	SUBJECT	PERIODS			Credit
			L	T	P	
THEORY						
1	BAS-203	Mathematics-II	3	1	0	4
2	BME-202 or BAS-202	Engg. Mechanics -I or Engg. Chemistry	3	1	0	4
3	BCS-201 or BEE-201	Computer Fundamentals & Programming in C or Electrical Engg.	3	1	0	4
4	BHU-201 or BEC-201	Professional Communication or Electronics Engineering	3	1	0	4
5	BAS-201	Engg. Physics-II	3	1	0	4
6	BAS-204 or BME-201	Environment & Ecology or Manufacturing Process	2	0	0	2
PRACTICAL/TRAINING/PROJECT						
7	BCE-251 or BME-251	Engg. Drawing & Computer Graphics or Workshop Practice	0	1	3	2
8	BME-252 or BAS-252	Engg. Mechanics Lab or Engg. Chemistry Lab	0	0	2	1
9	BCS-251 or BEE-251	Computer Fundamentals & Programming in C Lab or Electrical Engg. Lab	0	0	2	1
10	BHU-251 or BAS-251	Professional Communication Lab or Physics Lab	0	0	2	1
11	GP-201	General Proficiency	-	-	-	1
Total			17	6	9	28

BAS-103 – Mathematics –I

L T P T
3 1 0 4

MODULE-I

Matrices

Elementary row and column transformation, Rank of matrix, Linear dependence, Consistency of linear system of equations and their solution, Characteristic equation, Caley-Hamilton theorem, Eigen values and eigen vectors, Diagonalisation, Complex and unitary matrices, Application of matrices to engineering problems.

MODULE-II

Differential Calculus-I

Leibnitz theorem, Partial differentiation, Euler's theorem, Curve tracing, Change of variables, Expansion of function of several variables.

Differential Calculus-II

Jacobian, approximation of errors, Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications).

MODULE-III

Fourier Series Periodic functions, Trigonometric series, Fourier series of period 2π , Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.

Vector Calculus: Vector differentiation. Velocity, Acceleration of a particle moving on a space curve. Point function, Gradient, divergence and curl of a vector and their physical interpretations.

Text Books:-

1. H.K.Dass, Higher Engineering Mathematics, S.Chand Publications.
2. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 2004.

Reference Books:-

1. R.K.Jain & S.R.K.Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. C.Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd. 2003
5. Peter V. O'Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.
5. Peter V. O'Neil, "Advanced Engineering Mathematics", Thomson (Cengage) Learning, 2007.

MODULE-I**Chemical bonding**

Molecular Orbital Theory and its applications to Homo and Hetero diatomic molecules, Hydrogen bonding and its consequences, Band theory of metals and its applications.

Liquid crystalline state

Classification and its application.

Solid state

Solid state: Limiting radius ratio (cubic). Bragg's equation. Distinctive allotropes of carbon such as graphite and fullerenes (two dimensional); properties and applications.

Gaseous state

Gas laws: Boyle's law, Charles law, Gay Lussac law and kinetic theory of gases.

Reaction kinetics

Order and molecularity of reaction, integrated rate equation for zero first and second order. Theories of reaction rate.

Phase rule

Phase rule and its application to one component system (water)

Electrochemistry

Electrode potential, electrochemical and concentration cell, electrochemical theory of corrosion and its prevention.

MODULE-II**Concepts of organics**

Electronic displacement in covalent bonded compound, Stability of reaction intermediates; carbocation, carbanion, free radical. E-Z nomenclature and R-S configuration, Conformation of n butane, Nucleophilic substitution reactions

Structural and mechanistic

Reaction mechanism of

- (i) Aldol Condensation
- (ii) Cannizzaro Reaction
- (iii) Hoffmann Rearrangement
- (iv) Beckmann rearrangement
- (v) Diels Alder reaction.

Polymers

Polymerization techniques; addition, condensation and coordination polymerization. Structure, preparation, properties and application of Elastomers, plastomers, polyamides and polyesters. Conducting Polymers

MODULE-III**Spectroscopy**

Elementary idea and simple application of U.V, IR and NMR spectral techniques.

Water

Water processing: boiler feed water (Calgon process), process water (Zeolite process) potable water, (ion exchange method)

Fuel

Analysis of coal (proximate and Ultimate) and their implications, calorific value and its determination (Bomb Calorimeter).

Titrimetric analysis

Types of titrimetric analysis: Acid Base, Redox, Precipitation and Complexometric titrations

Text Books:-

1. *Cotton F.A., Wilkinson G., Murillo, C.A. and Bochmann* "Advanced inorganic chemistry", Wiley, Chichester, 1992
2. *Smith, Michael B./March Jerry, March, S* "Advanced organic chemistry Reaction, mechanism and structure", Wiley and Sons, 2007
3. *Glaston, Samuel B.* "Elements of physical chemistry", ELBS, 2005
4. *Finar, I.L.* "Organic Chemistry (vol I&II)", Addison-Wesley Longman Ltd.

Reference Book:-

1. *F.W. Billmeyer*, "Text Book of Polymer Science", John Wiley & Sons
2. *G.W. Gray and P.A. Winsor, Ellis* "Harwood series in Physical Chemistry, Liquid crystals and plastic crystals (vol I)", New York
3. *M.G. Fontana*, "Corrosion Engineering", McGraw Hill Publications.

MODULE -1

Two Dimensional Force Systems

Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position, Resultant of a force system, Simplest Resultant of Two dimensional concurrent and Non-concurrent Force systems, Distributed force system, Free body diagrams, Equilibrium and Equations of Equilibrium, Applications.

Friction

Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry-friction, Belt friction, Application.

MODULE- 2

Beam

Introduction, Shear force and Bending Moment, Differential Equations for Equilibrium, Shearforce and Bending Moment Diagrams for Statically Determinate Beams.

Trusses

Introduction, Simple Truss and Solution of Simple truss, Method of Joints and Method of Sections.

Centroid and Moment of Inertia

Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.

MODULE -3

Kinematics and Kinetics of Rigid Body

Introduction to stress and strain and their types Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity.

Introduction to Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium.

Simple Stress and Strain: Introduction, Normal and Shear stresses, Stress- Strain Diagrams for ductile and brittle material, Elastic Constants, One Dimensional Loading of members of varying cross-sections, Strain energy.

Pure Bending of Beams

Introduction, Simple Bending Theory, Stress in beams of different cross sections.

Torsion

Introduction, Torsion of shafts of circular section, torque and twist, shear stress due to torque.

Text books:

1. Irving H. Shames, "Engineering Mechanics", Prentice-Hall
2. Abdul Mubeen, "Mechanics of Solids", Pearson Education Asia.
3. E.P. Popov, "Mechanics of Materials", Prentice Hall of India Private Limited.

MODULE-I

DC Circuit Analysis and Network Theorems

Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements, source transformation. Kirchhoff's laws; mesh and nodal methods of analysis, star-delta transformation.

Network Theorems

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem (simple numerical problems).

Steady- State Analysis of Single Phase AC Circuits

AC Fundamentals: Sinusoidal, square and triangular waveforms – average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of series, parallel and series-parallel RLC Circuits: apparent, active & reactive powers, power factor, causes and problems of low power factor, power factor improvement; resonance in series and parallel circuits, bandwidth and quality factor (simple numerical problems).

Magnetic Circuit

Magnetic circuit concepts, analogy between electric & magnetic circuits, magnetic circuits with DC and AC excitations, magnetic leakage, B-H curve, hysteresis and eddy current losses, magnetic circuit calculations, mutual coupling

MODULE-II

Three Phase AC Circuits

Three phase system-its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relations, three-phase power and its measurement (simple numerical problems).

Single Phase Transformer

Principle of operation, construction, e.m.f. equation, equivalent circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer.

Measuring Instruments

Types of instruments, construction and working principles of PMMC and moving iron type voltmeters & ammeters, single phase dynamometer wattmeter and induction type energy meter, use of shunts and multipliers (simple numerical problems on energy meter, shunts and multipliers).

MODULE-III

Principles of electro mechanical energy conversion.

DC machines

Types, e.m.f equation of generator and torque equation of motor, characteristics and applications of dc motors (simple numerical problems).

Three Phase Induction Motor

Types, Principle of operation, slip-torque characteristics, applications (numerical problems related to slip only).

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Synchronous Machines

Principle of operation of alternator and synchronous motor.

Text Books:

1. *V. Del Toro, "Principles of Electrical Engineering" Prentice Hall International*
2. *S.N. Singh, "Basic Electrical Engineering" Prentice Hall International*
3. *I.J. Nagarath, "Basic Electrical Engineering" Tata McGraw Hill*

Reference Books:

1. *Edward Hughes, "Electrical Technology" Longman*
2. *T.K. Nagsarkar & M.S. Sukhija, "Basic Electrical Engineering" Oxford University Press.*
3. *H. Cotton, "Advanced Electrical Technology" Wheeler Publishing*
4. *W.H. Hayt & J.E. Kennely, "Engineering Circuit Analysis" Mc Graw Hill.*
5. *D.E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering Mc- Graw Hill*

MODULE-1

Introduction to any Operating System [Unix, Linux, Windows], Programming Environment, Write and Execute the first program, Introduction to the Digital Computer, Computer Generations, Concept of an algorithm, From algorithms to programs, Algorithm specification, top-down development and stepwise refinement. Introduction to Programming, Use of high level programming language for the systematic development of programs, Introduction to the design and implementation of correct, efficient and maintainable programs, Structured Programming, Trace an algorithm to depict the logic, Number Systems and conversion methods Application software, word processors, spreadsheets, Database management systems, Power point presentations

MODULE-2

Standard I/O in “C”, Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external,

Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity,

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch.

Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue.

Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

MODULE-3

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size.

Structures: Purpose and usage of structures, declaring structures, assigning of Structures.

Pointers to Objects: Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation. Sequential search Bubble and Selection Sort, String operations.

The Standard C Preprocessor: Defining and calling macros, utilizing conditional compilation, passing values to the compiler.

The Standard C Library: Input/Output : fopen, fread, etc, string handling functions, Math functions : log, sin, alike Other Standard C functions.

Text Books:

1. *Jeri R. Hanly, Elliot B. Koffman, “Problem Solving and Program Design in C”, Pearson Addison-Wesley, 2006.*
2. *Behrouz A. Forouzan, Richard F. Gilberg, Computer Science- “A Structured Programming Approach Using C”, Thomson, Third Edition [India Edition], 2007.*
3. *Victor Alvarado, Mocygo San Jose, “M. S. Office For ME Word, Excel, Power Point, CA”*
4. *Yashwant Kanetker, “Let us C”, BPB Publication, 2008.*
5. *Balagurusamy, “Programming in ANSI ‘C’, TMH, 3rd Edition”.*
6. *Detiel & Detiel, “‘C’ How to program, ISBN: 0132404168, 5th Edition, 2007”.*
7. *Dennis Ritchie, “‘C’ Programming, PHI”.*

MODULE –I

Semiconductor Diodes and Applications:

Introduction: Semiconductors, Extrinsic & Intrinsic type, doping, p-n junction diode, formation of depletion layer, Biasing, current equation, v-i characteristics, ideal and practical diodes, diode resistance, diode capacitance, Reverse recovery time.

Applications: P-N junction diodes as rectifiers (half wave and full wave), calculation of ripple factor, PIV, Calculation of DC component & AC components of Rectifier output, Diode as filter (Shunt capacitor filter), Introduction to clipping & clamping circuits, Voltage multipliers.

Breakdown diodes: Breakdown mechanism (zener and avalanche), breakdown characteristics, zener diode application as shunt regulator.

MODULE –II

Introduction to Transistor Family:

Bipolar Junction Transistor (BJT): Basic construction, transistor amplification action, input/output characteristics of CB CE and CC configurations, biasing of transistors (fixed bias, emitter bias, potential divider bias).

Field Effect Transistor (FET):

JFET: Basic construction, principle of working, concept of pinch-off, maximum drain saturation current, input and output characteristics, characteristic equation.

MOSFET: Depletion and Enhancement type MOSFET- construction, operation and characteristics.

MODULE III

Operational Amplifier (Op-Amp): Concept of ideal operational amplifier and its parameters, inverting, non-inverting and unity gain configurations, applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.

Switching Theory and Logic Design (STLD): Number systems & conversion of Bases (Binary, Octal, Decimal and Hexadecimal, Addition of Binary Numbers, subtraction using r's and (r-1)'s complement, Boolean algebra, logic gates, concept of universal gates, canonical forms, minimization using K-map (don't care conditions also).

CRO as Measurement Instrument: CRO (its working with block diagram), measurement of voltage, current, and frequency using CRO.

Books and references:

1. Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education 2007
2. Devid A. Bell "Electronic Devices and Circuits", 5th Edition, OXFORD University Press 2008
3. Jacob Millman/ Christos C. Halkias/ Satyabrata Jit "Electronics Devices and Circuits", 3rd Edition, TMH 2008
4. Morris Mano "Digital Computer Design", PHI 2003

Personality Enhancement Programme

Profiling (2 Days)

Ice Breaking Games (2 Hrs.)

Grooming Workshop (1 Day)

Self Awareness and Self Analysis (1 Hr.)

Confidence Building (1 Hr.)

Positive thinking and Motivation (1 hr.)

1. Grammar (12Hrs.)

- Subject verb agreement
- Tenses.
- One word substitution
- Article
- Correct and Incorrect Sentences
- Jumbled sentences
- Translation/Summary
- Direct Indirect
- Active Passive

2. Speaking Skills (18 Hrs.)

- Story building through opening sentences, Pictures, Flash cards, PPTs,
- Narration on given situations, Memories, Scenic, Emotions, Reporting incidents
- Conversation and Dialogues
- Situation (visit to a bank, booking a railway ticket, visit to a doctor, introduction over a social evening, leave during an emergency etc.,)
- Invitation to an Occasion
- Disagreement on a topic
- Conversation etiquettes on a social evening-Do's and Don't's

3. Listening skills (8 hrs.)

- Conversations and Dialogues
- Correct pronunciations
- Speeches/ motivation videos
- Comprehensions
- Passages/Stories of Acheivers
- English Songs

4. Writing Skills (10 Hrs.)

- Comprehension passages
- Short Speeches. (congratulatory, farewell, welcome, call for a meeting, conduct a random meeting, introduction ,minutes of meeting, agenda,

5. Reading Skills (12 hrs.)

- News paper Reading
- Corporate, Film/theatre, International news/Sports
- Questionnaire
- Interviews
- Case Study
- Aptitude Tests

6. Learning beyond Classrooms (LBC)

- Workshop on Psychological Analysis
- Workshop on interacting in Social evenings and Dining etiquettes
- Visit to a Bank/ Doctor
- Quiz
- Guest Lectures

MODULE - I

Relativistic Mechanics

Frame of reference, Galilean transformation, Inertial and Non-inertial frames, Postulates of special theory of relativity, Michelson-Morley experiment, Lorentz transformation of space and time, Length contraction, Time dilation, Addition of velocities, Variation of mass with velocity, Equivalence of mass and energy, Momentum-energy transformation equations

Interference

Theory of interference of light, Conditions for sustained interference, Classification of interference, Fresnel's Biprism experiment, displacement of fringes, Interference in thin films- wedge shaped film and Newton's rings.

MODULE- II

Diffraction

Single, Double & N- slit Diffraction, Diffraction grating, Grating spectra, Rayleigh's criterion and resolving power of grating

Polarization

Phenomena of double refraction, Doubly refracting crystals, Quarter wave plate & Half wave plate, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Optically active substance, Fresnel's theory of optical activity, Specific rotation and Polarimeters.

MODULE -III

Laser and Holography

Spontaneous and stimulated emission of radiation, Einstein's coefficients, construction and working of Ruby, He-Ne lasers and laser applications, Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography

Fiber Optics

Fundamental ideas about optical fiber, Types of fibers, Acceptance angle and cone, Numerical aperture, Propagation mechanism and communication in optical fiber, Attenuation, Signal loss in optical fiber and dispersion.

Reference Books:

1. Arthur Beiser, "Concepts of Modern Physics" - (Mc-Graw Hill)
2. Robert Resnick – "Introduction to Special theory of Relativity" - Wiely
3. Ajoy Ghatak, "Optics - (TMH)" Brijlal & Subramanian (S. Chand)
4. Anuradha De., "Optical Fibre & Laser " - (New Age)
5. Resnick, Halliday & Walker, " Fundamental of Physics" - (Wiely)
6. R.A. Serway & J.W. Jewett, "Principles of Physics" - (Thomson Asia Pvt. Ltd.)

MODULE- 1

Introduction to Materials and Manufacturing

Introduction to engineering materials such as metals and alloys and their applications. Art of manufacturing Classification of manufacturing processes, selection of a manufacturing, Guide to processing of metals and alloys. Importance of Materials & Manufacturing towards Technological & Socio-Economic developments Plant location Plant layout & its types. Types of Production. Production versus Productivity.

Properties of Materials

Strength, elasticity, stiffness, malleability, ductility, brittleness, toughness and hardness. Elementary ideas of fracture, fatigue & creep.

Ferrous Materials

Carbon steels, its classification based on % carbon as low, mild, medium & high carbon steel, its properties & applications. Pig iron, Wrought iron, Cast iron. Alloy steels: stainless steel, tool steel. Elementary introduction to Heat- treatment of carbon steels: annealing, normalizing, quenching tempering and hardening.

MODULE -2

Non-Ferrous metals & alloys

Common uses of various non-ferrous metals & alloys and its composition such as Cu-alloys: Brass, Bronze, Al-alloys such as Duralumin. Casting Pattern & allowances. Molding sands and its desirable properties. Mould making with the use of a core. Gating system. Casting defects & remedies. Cupola Furnace. Die-casting and its uses.

Metal Forming

Basic metal forming operations & uses of such as : Forging , Rolling , Wire & Tube-drawing/making and Extrusion, and its products/applications. Press-work, & die & punch assembly, cutting and forming, its applications. Hot-working versus cold-working.

Machining Processes and Machine Tools

Classification of machining processes and machine tools; Construction and working of lathe, Drilling machine, Shaper, Slotter and Planer, Boring Machine, Milling Machine, Grinding Machine, Brief introduction of Newer Machining Processes such as EDM, ECM, USM, LBM, WJM etc.

MODULE -3

Welding

Importance & basic concepts of welding, classification of welding processes. Gas-welding, types of flames. Electric-Arc welding. Resistance welding. Soldering & Brazing and its uses.

Non-Metallic Materials

Common types & uses of Wood, Cement-concrete, Ceramics, Rubber, Plastics and Composite-materials.

Misc. Processes

Powder-metallurgy process & its applications, Plastic-products manufacturing, Galvanizing and Electroplating

Modern Trends in Manufacturing

Automation, Concept of CAD, CAM and CIM; Concept of Micro manufacturing and nano-technology.

Text Books

1. Hajra & Bose, "Workshop Technology, Vol 1 & 2", Roy Media Promoters
2. Rao, P.N., "Manufacturing Technology", (Vol. 2), Tata McGraw-Hill
3. Kalpakjian, S., and Schmid, S.R., "Manufacturing Engineering and Technology", Pearson Education
4. Ghosh & Malik, "A textbook of Manufacturing Process".
5. J. K. Lal & N. V. Reddy, "Machining Senses".
6. Digarmo, "A textbook of Machining Process"

Reference Books

1. Raghuvanshi, B.S., "Workshop Technology, Vol 1 & 2", Dhanpat Rai & Sons
2. Laxmi Narayan & Vaish W, "A Text Book of Practical Geometrical" Drawin
3. Chapmann , "A book of Workshop technology, Vol.1,II, and III"

BAS-104/204- Environment & Ecology

MODULE-I

Environment Definition-Scope & Importance, Need for Public Awareness, Ecosystem-Food chain, Food-web, Ecological pyramids, Energy- photosynthesis, 10% Law, Food, Shelter, Economic & social security. Biogeochemical Cycles- Carbon, nitrogen & sulphur cycle.

MODULE -II

Natural Resources- Forest Resources -Types & Functions, Deforestation- causes & impacts, Chipko Movement , Water Resources, Energy- Conventional & Non- Conventional Energy resources - Solar, water, wind, ocean thermal, fossil fuels (coal, oil & natural gas). Solid Waste Management, Public Health Aspects, Sustainable Development.

MODULE -III

Pollution- Air, water, noise, soil & automobile pollution, Indian Legislation of Air & water Act, Wild Life Act, Environmental Impact Assessment.

Global Warming, Acid Rain, Climate Change, Ozone Layer, Green House Effects, Urbanisation, Population, Animal Husbandry, Environmental Education, Women Education.

Text Books:

1. Benny Joseph – “Environmental Studies” –Tata McgrawHill-2005
2. Dr. D.L. Manjunath, “Environmental Studies” –Pearson Education-2006.
3. R. Rajagopalan – “ Environmental studies” –Oxford Publication – 2005.
4. M. Anji Reddy – “ Text book of Environmental Science & Technology” –BS Publication.

ReferenceBooks

1. P. Venugoplan Rao, “Principles of Environmental Science and Engineering” –Prentice Hall of India.
2. Meenakshi, “Environmental Science and Engineering” –Prentice Hall India

1. Carpentry Shop

1. Study of tools & operations and carpentry joints.
2. Simple exercise using jack plane.
3. To prepare half-lap corner joint, mortise & tennon joints.
4. Simple exercise on woodworking lathe.

2. Fitting Bench Working Shop

1. Study of tools & operations
2. Simple exercises involving fitting work.
3. Make perfect male-female joint.
4. Simple exercises involving drilling/tapping/dieing.

3. Black Smithy Shop

1. Study of tools & operations
2. Simple exercises base on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

4. Welding Shop

1. Study of tools & operations of Gas welding & Arc welding
2. Simple butt and Lap welded joints.
3. Oxy-acetylene flame cutting.

5. Sheet-metal Shop

1. Study of tools & operations.
2. Making Funnel complete with 'soldering'.
3. Fabrication of tool-box, tray, electric panel box etc.

6. Machine Shop

1. Study of machine tools and operations.
2. Plane turning.
3. Step turning
4. Taper turning.
5. Threading
6. Single point cutting tool grinding.

7. Foundry Shop

1. Study of tools & operations
2. Pattern making.
3. Mould making with the use of a core.
4. Casting

8. Electroplating Shop

9. Unconventional Energy Resources, Solar Energy/Wind (Lab Model).

10. Metal Forming: Introduction to metal forming, Extrusion and Forging.

1. Introduction to Computer Aided Sketching

Introduction, Drawing Instruments and their uses, BIS conventions, lettering Dimensioning and free hand practicing.

Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Coordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line convention, material conventions and lettering. **2-Sheet**

2. Orthographic Projections

Introduction, Definitions- Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems). **2-Sheet**

3. Orthographic Projections of Plane Surfaces

(First Angle Projection Only)

Introduction, Definitions-projections of plane surfaces-triangle, square rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates.) **1-Sheet**

4. Projections of Solids (First Angle Projection Only)

Introduction, Definitions- Projections of right regular- tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. (No problems on octahedrons and combination solid) **2-Sheet**

5. Sections and Development of Lateral Surfaces of Solids

Introduction, Section planes, Sections, section views, Sectional views, apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on section of solids) **1-Sheet**

Development of lateral surface of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, Tetrahedrons spheres and transition pieces), Intersection of solids.

6. Isometric Projection (Using Isometric Scale Only)

Introduction, Isometric scale, Isometric Projection of simple plane figures, Isometric Projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three Solids).

7. Introduction to computer graphics:

Note : At least 3 drawing assignments must be on AUTOCAD.

Text Books:

1. N.D. Bhatt & V.M. Panchal, "Engineering Drawing" –, 48th edition, 2005 Charotar Publishing House, Gujarat.
- 2." A Primer on Computer Aided Engineering Drawing"-2006, Published by VTU, Belgaum.

Reference Books:

1. S. Trymbaka Murthy, "Computer Aided Engineering Drawing" –I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2. K.R. Gopalakrishna, "Engineering Graphics", 32nd edition, 2005 – Subash Publishers Bangalore.
3. Luzadder Warren J, duff John M.- "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, 2005 – Prentice- Hall of India Pvt. Ltd., New Delhi.

BAS-152/252- Engineering Chemistry Lab

Volumetric Analysis (Any five)

1. Determination of constituents and amount of alkalinity of water sample.
2. Determination of temporary and permanent hardness (Complexometric titration).
3. Determination of available chlorine in bleaching powder.
4. Determination of chloride content in water (Mohr,s Method).
5. Determination of iron content in the ore sample using external indicator.
6. Analysis of river water: suspended matter, TDS, heavy metals and pH.
7. Determination of BOD and COD of river water sample.
8. Determination of equivalent wt. of iron by chemical displacement method

Instrumental Analysis (Any two)

9. Determination of strength of a unknown acid solution by pH metric titration.
10. Determination of iron concentration in water by calorimetric method.
11. Determination of viscosity of addition polymer by viscometer.(Polystyrene)

Miscellaneous [Prep (1) and Elemental & Functional (2)]

12. Preparation of Bakelite resin.
13. Synthesis of Aspirin
14. Elemental analysis of organic compounds
15. Determination of functional groups in organic compounds

BME-152/252- Engineering Mechanics Lab

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1. (a). To conduct the tensile test and determine the ultimate tensile strength, percentage Elongation for a steel specimen.
(b). To determine the compression test and determine the ultimate compressive strength for a Specimen
2. To conduct the Impact-tests Izod and Charpy on Impact-testing machine to find the Toughness.
3. To determine the hardness of the given specimen using Brinell and Rockwell hardness testing machine.
4. (a) Friction experiments on inclined plane.
(b) Belt-Pulley experiment
5. (a). To study the slider-crank mechanism.
(b). Simple & compound gear-train experiment.
6. Worm & worm-wheel experiment for load lifting.
7. (a). Bending of simply-supported beam for theoretical & experimental deflection.
(b). Torsion of rod/wire experiment.
8. (a). Experiment on Trusses.
(b). Statics experiment on equilibrium.
9. (a). Dynamics experiment on momentum conservation
(b). Dynamics experiment on collision for determining coefficient of restitution.
10. Experiment on Moment of Inertia.

List of Experiments

Note : A minimum of 10 experiments from the following should be performed

1. Verification of Kirchhoff's laws
2. Verification of (i) Superposition theorem (ii) Thevenin's Theorem (iii) Maximum Power Transfer Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor.
6. Determination of parameters of ac single phase series RLC circuit
7. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer
8. To study speed control of dc shunt motor using (i) armature voltage control (ii) field flux control.
9. Determination of efficiency of a dc shunt motor by load test
10. To study running and speed reversal of a three phase induction motor and record speed in both directions.
11. To measure energy by a single phase energy meter and determine error.
12. To study P-N diode characteristics
13. To study full wave and half wave rectifier circuits with and without capacitor and determine ripple factors.
14. To study various logic gates (TTL)
15. To study Operational Amplifier as Adder and Subtractor
16. To study transistor as a switch.

Assignments will be conducted in tandem with the theory course so that the topics for problems given in the lab are already initiated in the theory class. The topics taught in the theory course should appropriately be sequenced for synchronization with the laboratory.

Assignments for lab classes are as follows:

1. Introduction of Computer System: I/O devices, storage devices.
2. Getting familiar with software: OS and C compiler.
3. Write a program to print Hello.
4. Write a program to add two integers.
5. Write a program to compute factorial of a number.
6. Write a program to determine whether a number is prime or not.
7. Write a program to print Fibonacci series. .
8. Write a program in C to check whether a given number is Armstrong or not?
9. Write a program to calculate factorial of an integer using recursion.
10. Show with example (program) how arguments are passed using 'Call by value' and 'Call by reference' respectively.
11. Write a program to print the sum of all values of an array.
12. Write a program in C that accepts N x N matrix as input and prints transpose of this matrix.
13. Write a program to add the elements of two arrays in to third array using dynamic memory allocation.
14. Write a program in C to calculate the sum of series up to first 10 terms
 $1^4 + 2^4 + 3^4 + 4^4 + 5^4 + 6^4 + 7^4 + \dots + 10^4$
15. Write a program in C that takes input from a file and write it into another file.
16. Write a program to implement stack operation (Push & Pop).
17. Write a program to create a link list.

List of Experiments

Any ten experiments, at least four from each group.

Group –A

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To study the polarization of light by simple reflection using laser.
7. Measurement of Wavelength of a laser (He- Ne) light using single slit diffraction.

Group – B

8. To determine the specific resistance of a given wire using Carey Foster's bridge.
9. To study the variation of magnetic field along the axis of current carrying - Circular coil and then to estimate the radius of the coil.
10. To verify Stefan's Law by electrical method.
11. To calibrate the given ammeter and voltmeter by potentiometer.
12. To study the Hall effect and determine Hall coefficient, carrier density and - mobility of a given semiconductor using Hall effect set up.
13. To determine the energy band gap of a given semiconductor material.
14. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
15. To draw hysteresis curve of a given sample of ferromagnetic material and from - this to determine magnetic susceptibility and permeability of the given specimen.
16. To determine the ballistic constant of a ballistic galvanometer.
17. To determine the coefficient of viscosity of a liquid.
18. Measurement of fiber attenuation and aperture of fiber.
19. High resistance by leakage method.
20. Magnetic Susceptibility of paramagnetic solution.

BHU-151/251- Professional Communication Lab

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1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics/Kinesics.
4. Presentation Skills for Technical Paper/Project Reports/ Professional Reports based on proper Stress and Intonation Mechanics.
5. Official/Public Speaking based on suitable Rhythmic Patterns.
6. Theme- Presentation/ Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehension Skills based on Reading and Listening Practicals on a model Audio-Visual Usage.

Reference Books

1. *Bansal R.K. & Harrison: "Phonetics in English", Orient Longman, New Delhi.*
2. *Sethi & Dhamija: "A Course in Phonetics and Spoken English", Prentice Hall, New Delhi.*
3. *L.U.B.Pandey & R.P.Singh, "A Manual of Practical Communication", A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi.*
4. *Joans Daniel, "English Pronouncing Dictionary", Cambridge Univ. Press.*

MODULE-I

Numerical Techniques – I

Zeros of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals.

Numerical Techniques –II

Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration, Trapezoidal, Simpson's one third and three-eighth rules, Solution of ordinary differential (first order, second order and simultaneous) equations by Euler's, Picard's and fourth-order Runge-Kutta methods.

MODULE-II

Statistical Techniques - I

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non-linear and multiple regression analysis, Probability theory.

Statistical Techniques - II

Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations, Chi-square test, t-test.

MODULE-III

Multiple Integrals

Double and triple integral, Change of order, Change of variables, Beta and Gamma functions, Application to area, volume, Dirichlet integral and applications.

Vector Calculus

Line, surface and volume integrals, Statement and problems of Green's, Stoke's and Gauss divergence theorems (without proof).

Text Books:-

1. H.K.Dass, Higher Engineering Mathematics, S.Chand Publications.
2. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 2004.

Reference Books:-

1. R.K.Jain & S.R.K.Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. C.Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd. 2003
5. Peter V. O'Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.

MODULE -I

Wave Mechanics

Wave- particle duality, de-Broglie matter waves, Phase and Group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrödinger's wave equation – particle in one dimensional box

Solid State Physics & X- Rays

Space lattice, Unit cell, Miller indices, Interplaner spacing, Coordination numbers, Crystal structure, sc, bcc, fcc structures, Characteristic and Continuous X-ray spectra, Mosley's law, X-ray absorption and diffraction, Bragg's law, Bragg's diffractometer, Compton's effect.

MODULE- II

Dielectric and Magnetic Properties of Materials

Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability) Equation of internal fields in liquid and solid (One- Dimensional), Clausius Mussoiti- Equation, Frequency dependence of dielectric constant, Dielectric Losses, Important applications of dielectric material, Dia, Para and Ferro magnetic materials, Langevin's theory for diamagnetic material, Phenomena of hysteresis and its applications

Electromagnetic Theory

Displacement Current, Maxwell's Equations (Integral and Differential Forms), Equation of continuity, EM Wave equation and its propagation characteristics in free space and in conducting media, Poynting theorem and Poynting vectors

MODULE -III

Superconductivity

Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Type I and Type II superconductors, Temperature dependence of critical field, BCS theory (Qualitative), High temperature superconductors. Characteristics of superconductors in superconducting state, Applications of Super-conductors

Science and Technology of Nanomaterials

Introduction to Nanomaterials: Basic principle of nano-science and technology, Creation and use of buckyballs, structure, properties and uses of Carbon nanotubes, Applications of nanotechnology.

Reference books:

- 1- Beiser, " Concept of Modern Physics" - (Tata Mc-Graw Hill)
- 2- C. Kittel, "Solid State Physics" - 7th edition (Wiley Eastern)
- 3- V. Raghavan, " Materials Science" - (Prentice- Hall India)Engineering
- 4- S.O. Pillai, "Solid State Physics" - 5th edition (New Age International)
- 5- Rechard Booker and Earl Boysen, "Nanotechnology" - (WileyPublishing)
- 6- David J. Griffith, "Introduction to Electrodynamics" - (PH I)