

Syllabus for B.Tech First Semester and second semester students

FIRST SEMESTER

GROUP-A

Sr. No.	Course Code	Name	L	T	P	Contact hours	Credit
1	MA-101	Mathematics-I	3	1	0	4	4
2	PH-101	Physics	3	1	0	4	4
3	IC/EC-101	Electrical Sciences	3	1	0	4	4
4	CS-101	Computer Programming	2	0	0	2	2
5	BT-101	Bio Sciences	3	0	0	3	3
6	HM-101	Psychology of Human Behaviour	2	0	0	2	2
7	PH-102	Physics Lab	0	0	2	2	1
8	ME-101	Engineering graphics	1	0	4	5	3
9	IC/EC-102	Electrical Science Lab	0	0	2	2	1
10	CS-102	Computer Programming Lab	0	0	2	2	1
		Total	17	03	10	30	25

GROUP-B

Sr. No.	Course Code	Name	L	T	P	Contact hours	Credit
1	MA-101	Mathematics-I	3	1	0	4	4
2	CH-101	Chemistry	3	1	0	4	4
3	ME-102	Elements of Mechanical Engg.	3	1	0	4	4
4	HM-103	English Communication	3	0	0	3	2
5	CE-101	Environmental Science & Tech.	2	0	0	2	2
6	HM-102	Introduction to Management	2	0	0	2	2
7	IE-101	Manufacturing Processes	1	0	4	5	3
8	ME-103	Mechanical Engineering. Lab	0	0	2	2	1
9	HM-104	English Communication Lab	0	0	2	2	2
10	CH-102	Chemistry Lab	0	0	2	2	1
		Total	17	03	10	30	25

SECOND SEMESTER

GROUP-A

Sr. No.	Course Code	Name	L	T	P	Contact hours	Credit
1	MA-102	Mathematics-II	3	1	0	4	4
2	CH-101	Chemistry	3	1	0	4	4
3	ME-102	Elements of Mechanical Engg.	3	1	0	4	4
4	HM-102	English Communication	3	0	0	3	3
5	CE-101	Environmental Science & Tech.	2	0	0	2	2
6	HM-103	Introduction to Management	2	0	0	2	2
7	IN-101	Manufacturing Processes	1	0	4	5	3
8	ME-103	Mechanical Engineering. Lab	0	0	2	2	1
9	HM-104	English Communication Lab	0	0	2	2	1
10	CH-102	Chemistry Lab	0	0	2	2	1
Total			17	03	10	30	25

GROUP-B

Sr. No.	Course Code	Name	L	T	P	Contact hours	Credit
1	MA-102	Math-II	3	1	0	4	4
2	PH-101	Physics	3	1	0	4	4
3	IC/EC-101	Electrical Sciences	3	1	0	4	4
4	CS-101	Computer Programming	2	0	0	2	2
5	BT-101	Bio Sciences	3	0	0	3	3
6	HM-101	Psychology of Human Behaviour	2	0	0	2	2
7	PH-102	Physics Lab	0	0	2	2	1
8	ME-101	Engineering graphics	1	0	4	5	3
9	IC/EC-102	Electrical Science Lab	0	0	2	2	1
10	CS-102	Computer Programming Lab	0	0	2	2	1
Total			17	03	10	30	25

CH-101 Chemistry

Part A: Conceptual Chemistry

1. **Molecular Structure and Bonding:** The VSEPR model, Valence-bond theory, Molecular orbital theory, molecular orbitals of polyatomic molecules, The molecular orbital theory of solids, Semi conduction and Superconduction. 4
2. **Redox Behavior and its Implications:** Reduction Potentials, Redox stability in water, The diagrammatic presentation of potential data, The effect of complex formation on potentials. 3
3. **Chemical and Phase Equilibria:** Phase diagram for single component system, Phase diagram for mixtures, Properties of non-electrolyte solutions, Kinds of Electrodes, Concentration Cells, Corrosion of Metals in Acids, Corrosion by oxygen, Corrosion by Metal contact, The Lead storage cell and Fuel Cell. 5
4. **Chemical Response to Photons:** Laws of Photochemistry, Photo physical processes, Fluorescence and Phosphorescence, Flash photolysis, Photochemical reactions: Photolysis of HI, Photochemical reaction between H_2 and Br_2 , Photosensitized reactions and photocleavage of water. 3
5. **Probes (Tools) for Structural Elucidation:** Lambert Beer's Law, Principles and applications of U.V. Visible Molecular Absorption Spectroscopy; Chromophores, Effect of Conjugation on Chromophores, Absorption by aromatic systems, Rotational and Vibrational Spectroscopy-Principles and application to simple molecules, Magnetic Resonance Spectroscopy-Principles and Application to simple molecules and Introduction to Photoelectron Spectroscopy. 5
6. **Coordination Bond and its Implications:** Bonding in tetrahedral and octahedral Complexes, Applications in analytical chemistry, Biological system, Catalysis and Sandwich Compounds, Oxygen Storage and Transport. 4
7. **Thermodynamic and Kinetic Aspects of Chemical Conversion:** Free Energy and its Implications in occurrence of a Chemical Reaction, Kinetic Aspects of Occurrence of a Chemical Reaction and Examples of Significant Chemical Reactions. 4
8. **Solid State, Adsorption and Diffusion:** Introduction to Solid State Chemistry, Physical and Chemical Adsorption, Theories of Adsorption, Adsorption Isotherms, Laws of Diffusion and its implications, Nernst Distribution Law and Solvent Extraction. 3

9. **Basic Principles of Organic Synthesis:** Substitution, Elimination, Addition and Rearrangement Reactions, Reagents used in organic synthesis. 4

Part B: Chemistry in the Service of Society (Illustrative Examples and application Only)

Building and Construction Materials(1), Health and Medicine(2), Materials for Electronics(1), Material for Transport Technology(1), Materials for Energy Devices(2), Environment-Pollution Monitoring and Control(2) and Catalysis and catalyst Development(1).

Books Recommended

1. Shriver D F and Atkin A W, "*Inorganic Chemistry*" 3rd Ed., ELBS, Oxford Press, Delhi (1999).
2. Castellan G W "*Physical Chemistry*" 3rd Ed., Narosa (1995).
3. Morrison R T and Boyd R N "*Organic Chemistry*", 6th Ed., Pearson Education, New Delhi (2002).
4. Skoog D A, Holler F J and Nieman T. A., "*Principles of Instrumental Analysis*", 5th Ed., Harcourt Asia PTE Ltd. Singapore (2001).
5. Hill J W "*Chemistry for Changing times*" 6th Ed., Macmillan, Canada (1995).

CH-102 Chemistry Laboratory

[0 0 2 1]

1. To draw the phase diagram of lead-in binary system.
2. To study the adsorption of acetic acid on activated charcoal.
3. To verify Beer's law for a coloured solution and to determine the concentration of a given unknown solution.
4. Determine the partition coefficient of iodine between carbon tetrachloride and water.
5. Determine the viscosity of a given liquid by Oswald's viscometer.
6. To determine the molecular weight of a given compound by cryoscopy.
7. Isolation of caffeine from tea leaves
8. To Synthesize paracetamol and determine percentage yield of the product.
9. To synthesize Phenol and Urea formaldehyde resin.
10. Thin layer-chromatographic separations of amino acids/organic molecules.
11. Determination of ion-exchange capacity of a given ion-exchanger (cationic /Anionic).
12. Determination of COD of water sample.
13. To draw the pH-titration curve of strong acid vs strong base.
14. To determine concentration of trace metals by atomic absorption spectrophotometer.
15. An investigatory project (compulsory for all students).

Formation of ordinary differential equations, solution of first order differential equations by separation of variables, homogeneous equations, exact differential equations, equations reducible to exact form by integrating factors, equations of the first order and higher degree, Clairaut's equation.

Linear differential equations with constant coefficients, Cauchy's homogeneous linear equation, Legendre's linear equation, simultaneous linear equations with constant coefficients.

Fourier series of periodic functions, even and odd functions, half range expansions and Fourier series of different wave forms, complex form of Fourier series and practical harmonic analysis.

Laplace transforms of various standard functions, properties of Laplace transforms and inverse Laplace transforms, Convolution theorem, Laplace transforms of unit step function, impulse function and periodic functions, application to solution of ordinary differential equations with constant coefficients and simultaneous differential equations.

Z-transform and difference equations, elementary properties of z-transform, Convolution theorem, formation of difference equations using z-transform.

Fourier transforms, Fourier integral theorem, Fourier sine, cosine integrals and transforms, Fourier transforms of derivatives of a function, convolution theorem, Parseval's identity.

Books Recommended:

1. E Kreyszig, "Advanced Engineering Mathematics", 8th Ed., John Wiley, Singapore (2001).
2. R K Jain and S R K Iyengar, "Advanced Engineering Mathematics", 2nd Ed., Narosa Publishing House, New Delhi (2003).
3. B S Grewal, "Higher Engineering mathematics", Thirty-fifth edition, Khanna Publishers, Delhi

Linear dependence of vectors and rank of matrices, linear transformations and inverse of matrices, reduction to normal form, bilinear form and quadratic form, consistency and solution of linear algebraic system of equations, eigen values, eigen vectors and their applications to system of ordinary differential equations, Cayley Hamilton theorem, orthogonal, unitary, hermitian and similar matrices.

Differential calculus of functions of several variables, partial differentiation, homogeneous functions and Euler's theorem, Taylor's and Maclaurin's series, Taylor's theorem for functions of two variables, functions of several variables, Lagrange's method of multipliers.

Double and triple integrals, change of order of integration, change of variables, applications to evaluation of area, surface area and volume.

Scalar, and vector fields, differentiation of vectors, velocity and acceleration, vector differential operators Del, Gradient, Divergence and Curl and their physical interpretations, formulae involving these operators, line, surface and volume integrals, solenoidal and irrotational vectors, Green's theorem, Gauss divergence theorem, Stoke's theorem and their applications.

Formulation and classification of partial differential equations, solution of first order linear equations, standard forms of non-linear equations, Charpit's method, linear equations with constant coefficients, non-homogenous linear equations, Monge's method for non-homogenous equations of second order, separation of variables method for solution of heat, wave and Laplace equation.

Books Recommended:

1. E Kreyszig, "Advanced Engineering Mathematics", 8th Ed., John Wiley, Singapore (2001).
2. R K Jain and S R K lyengar, "Advanced Engineering Mathematics", 2nd Ed., Narosa Publishing House, New Delhi (2003).
3. I A N Sneddon, "Elements of Partial Differential Equations", Tata McGraw Hill, Delhi (1974).
4. B S Grewal, "Higher Engineering Mathematics", Thirty-fifth edition, Khanna Publishers, Delhi.

1. **Electrostatics:** Gradient of a scalar, divergence and curl of a vector, Gauss's law and its applications; electric potential and electric field (in vector form); potential due to a monopole, dipole and multipoles (multipole expansion); work and energy in electrostatics; dielectrics; polarization, electric displacement, susceptibility & permittivity, Clausius Mossotti equation.
(08 Lectures)
2. **Magnetostatics and Electrodynamics:** Lorentz Force Law; magnetic field of a steady current (Biot – Savart law); ampere's law and its applications; ampere's law in magnetized materials; electromotive force; Faraday's law; maxwell's Equations, Wave Equation.
(06 Lecturer)
3. **Lasers:** Spontaneous and stimulated emission; Elnstein's coefficients, population inversion and optical pumping; three and four-level lasers; Ruby, He-Ne, Nd: Yag, CO₂, semiconductor lasers. Industrial and medical applications of lasers.
(08 Lecturer)
4. **Theory of Relativity:** Invariance of an equation and concept of ether; Micheison Morley experiment; Einstein's postulates and Lorentz transformation equations, length, time and simultaneity in relativity; addition of velocity, variation of mass with velocity, mass-energy relation, energy-momentum relation.
(08 Lecturer)
5. **Quantum Theory:** The Compton effect; matter waves; group and phase velocities, Uncertainty principle and its application; time independent and time dependent Schrödinger wave equation; Eigen values and Eigen functions; Born's interpretation and normalization of wave function, orthogonal wave functions; applications of Schrödinger wave equation (particle in a box and harmonic oscillator).
(09 Lecturer)
6. **Radioactivity:** Radioactive Decay, Half-Life, Radiometric Dating, Radioactive Series, Alpha Decay Beta Decay, Gamma Decay, Radiation Hazards, Uses of Radio-Isotopes. Nuclear Fission, Nuclear Fusion, Nuclear reactions, Laws of nuclear reactions, Nuclear energy. Different types of nuclear reactors.
(09 Lecturer)

Text Books:

1. Griffiths, D “*Introduction to Electrodynamics*” 2nd Ed., Prentice Hall of India, New Delhi (1998).
2. Thyagarajan, K and Ghatak A.K., “*Lasers, - Theroy and Applications*”, Macmilan India Ltd., New Delhi, (2000).
3. Beiser, “*Perspective of Modem Physics*” 5th Ed., McGraw Hill KOGAKUSHA Ltd., New Delhi, (2002).

Reference Books:

1. Arya, A.P. “*Elementary Modem Physics*” Addison –Wesley, Singapore, 1974.
2. Mani, H.S. and Mehta G.K. “*Introduction to Modem Physics*”, Affiliated East West Press, New Delhi, 1991.
3. Milonni P.W and Joseph Eberly J.H. “*Lasers*” John Wiley and Sons, Singapore, 1991.

LIST OF EXPERIMENTS

1. To verify the laws of vibrating strings by Melde's experiment that is to show that $\frac{\lambda^2}{T} = \text{constant}$.
2. To determine the frequency of AC Mains by using a sonometer and an electro-magnet.
3. To determine the impedance of A.C. Circuits.
4. To study the characteristics of PN diode and Zener diode.
5. To find out the intensity response of a solar cell/Photo diode.
6. To analyze the suitability of a given Zener diode as a power regulator.
7. To determine the band gap of a semiconductor.
8. To determine the Refractive index of the Prism material using spectrometer.
9. To determine the wavelength using Fresnel's Biprism/Diffraction grating.
10. To determine the wavelength of sodium light using Newton's ring method.
11. To determine the specific rotation of sugar using Laurent's half-shade polari meter.
12. To determine the velocity of ultrasonic waves in liquids.
13. To study the effect of voltmeter resistance on voltage measurement.
14. To study the variation of magnetic field with distance along the axis of a circular coil carrying current and its estimate the radius of the coil.
15. To determine the Laser Parameters like divergence, wavelength etc. for a given laser source.

Recommended Books:

1. Dr. R.S. Sirohi, Practical Physics, Wiley Eastern, New Delhi.

CE- 101

Environmental Science and Technology

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Population scenario, Urbanization, Income distribution. Natural resource utilization, Pattern of growth, Quality degradation, Limits to grow, Sustainable development. Environmental issues in Industry: Pollution and control, Recycled systems, Environmentally friendly technology, economics of environmental technology, Hazardous wastes. Global warming: Green house gases, impact of global warming, Remedial measures, Global convention. Thinning Ozone Layer: Causes, Health risks, Preventive measures. Oceans, Coastal areas: Ocean's role in hydrologic cycle and weather, Productivity of coastal zone, High seas, resources, Sustainability. Environmental issues in forest management, Water pollution, Treatment /purification of water, Water standard for Drinking.

Introduction: Computer system, Software and hardware concepts. Introduction to word processor and system software's viz. MS Office.

Major elements of C++ program, Declarations of Variables, Body of Statements and functions, Identifiers, Keywords, Data types, Variables, Expressions, Statements, Type Conversions, Operators, Arithmetic operators, Unary operators, Binary operators, Char type, Cast operator, Precedence and Associativity of operations, Change of Precedence, Assignment operators, Bitwise operators, Shift operators, Relational operators, Loops, For loop and its variants, While loop, do-while loop, if statement, if else statement, Switch function, Ternary operators, Logical operators, Break function, Continue function, Null statement, Goto Function.

Defining a function, Types of structure declarations, User defined data types, Nested structure declaration, Initialization of structure, processing structures with initialized values, Processing Enumeration data type, Unions.

Function prototypes, Passing arguments to a function, Passing arguments by value, Returning value, Specifying arguments by data types, Passing arguments by reference, References, Passing arguments to a function by reference, function Overloading, Inline functions, Recursion, Storage classes and scope.

Class, objects, Data Abstraction, Data Hiding, Encapsulation, C++ objects as data types, Scope resolution operator, Public and private member functions, Nesting of member functions, Friend functions, Constructors, Destructors, Static data members static member functions.

Array and Operator overloading: Array, Operations on Arrays, Multi-Dimensional Array, Array as Class member Data, Use of Arrays with a class, Array of objects, Operator overloading, Overloading Unary operators, Multiple overloading, and Overloading Binary operators.

Inheritance: Base class, Derived class, Visibility modes, Derivation and friendship, Types of Inheritance, Containership, Virtual functions Binding, Pure Virtual functions, Abstract class, Pointers, Accessing the pointer's object, Pointers and arrays, Operations on Pointers, Pointers and functions, structures and pointers, pointer to objects, this pointer.

Stream class: hierarchy, Stream classes, String I/O, Reading and Writing strings Character I/O, File Pointers, Random Access, Redirection, Command line arguments Printer output, Overloading extraction and insertion operators, File updating.

Books Recommended

1. Bjarne Stroustrup, "*C++ Programming Language*", 3rd edition, Pearson Education Asia, (1997)
2. Lafore R, "*Object Oriented Programming in C++*", 4th Ed., Techmedia, New Delhi (2002).
3. Yashwant Kenetkar, "*Let Us C++*", 1st Ed. BPB Publication, New Delhi (1999).
4. Sourav Sahay, "*Object Oriented Programming with C++*", 1st Ed., Oxford University Press (2006)
5. B. A. Forouzan and R. F. Gilberg, Complier Science, "A Structured approach using C++," Cengage Learning, New Delhi.

1. Program to make use of the if else if structure.
2. Program to make use of the switch statement.
3. Program to make use of the nested for loop.
4. Program to make use of the nested while loop.
5. Program to implement do-while loop.
6. Program to find the factorial of a number using functions.
7. Program to print the Fibonacci series using functions.
8. Program to overload functions.
9. Program to display the details of a employee record using nested structures.
10. Program to display the result card of student record using Union.
11. Program to calculate the area of rectangle and square using classes.
12. Program to implement 'date class' containing data members: day, month and year. Implement assignment operator and copy constructor in this class.
13. Program to perform insertion and deletion operations on arrays.
14. Program to merge to arrays.
15. Program to implement Multiple Inheritance.
16. Program to implement Multi level Inheritance.
17. Program to demonstrate Hybrid Inheritance.
18. Program to demonstrate containership.
19. Program to multiply two arrays using pointers to the functions.
20. Program to give the command line arguments and displaying those using files.

This is only the suggested of Practicals. Instructor may frame additional Practicals relevant to the course contents.

Network Laws and Theorems: Network Laws for D.C. networks, Node voltage & mesh current methods, delta-star and star-delta conversion, classification of network elements, Principle of superposition, Thevenin's & Norton's Theorems.

Single Phase A.C. Circuits: 1-phase EMF generation, Effective and Average values of sinusoids and determination of form factor, Analysis of simple RLC-series circuits, Solution of parallel circuits and resonance.

Three Phase A.C. Circuits: 3-phase EMF generation, Delta and star connection, Line & phase quantities and relations, Solution of 3-phase circuits-balanced voltage & balanced load, Phasor diagrams, Measurement of power in three-phase circuits. Concept & working of wattmeter & A.C watt-hour meters.

Magnetic Circuits and Transformers: Analogy between electric & Magnetic circuits, Ampere's circuital law, Solutions of Magnetic Circuits, Hysteresis and Eddy current losses, constructional details, EMF equation, rating and phasor diagrams on no-load & full-load, Equivalent circuits, Regulation and efficiency, Open-circuit & short-circuit tests.

Basic Semiconductor Concepts and Devices: Intrinsic and extrinsic semiconductors, diffusion and drift currents, p-n junction under open-circuit, reverse-bias and forward-bias conditions, p-n junction in the breakdown region, Ideal diode, terminal characteristics of junction diode, load –line analysis of diode circuits, Bipolar junction transistor-physical structure and modes of operation, transistor as a switch.

Feedback Amplifiers and Oscillators: Concept of feedback, positive and negative feedback, General feedback structure, Effect of positive and negative feedback on amplifier gain and bandwidth, advantages of negative feedback, basic principles of sinusoidal oscillators, Oscillation criteria.

Operational Amplifiers: Op-amp terminals, ideal Op-amp, equivalent model, Inverting and non-inverting configurations, Application of Op-amps.

Power Supplies: Block diagram of power supply, Half-wave, full-wave and Bridge rectifiers, passive filters, Regulators, Line regulation and load regulation, Zener diode as voltage regulator, Working of Switched Mode Power Supply (SMPS).

Books Recommended

1. Del Torro, "*Electrical Engineering fundamentals*", 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi (1994).
2. Kothari D P and Nagrath I J, "*Basic Electrical Engineering*", Tata McGraw Hill, New Delhi (1996).
3. Nagsarkar T K and Skhija M S, "*Basic Electrical Engineering*", Oxford Univ. Press, New Delhi (2005).
4. John D Ryder, "*Electronic Fundamentals and Applications*", 5th PHI, New Delhi.
5. Boylestad and Nashelsky, "*Electronic Devices and Circuit Theory*", 8th Ed. Pearson Education India, New Delhi (2002).
6. Edward Hughes, Ian McKenzie Smith, John Hiley, Keith Brown, "*Hughes Electrical & Electronic Technology*", 8th Ed., Pearson Education India, New Delhi (2002).

1. To measure the armature and field resistance of a DC Machine
2. To calibrate a test (moving iron) ammeter and a (dynamometer) wattmeter with respect to standard (DC PMMC) ammeter and voltmeters.
3. Verification of circuit theorems, Thevenin's and Superposition theorems (with DC sources only).
4. To obtain voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current and voltages in R-L-C series circuit excited by (single phase) AC supply and to develop phasor diagram.
6. Open circuit and short circuit tests on a single-phase transformer and to obtain P_i -loss, P_c -loss efficiency & regulation.
7. Connection and starting of a three-phase induction motor using direct on line (DOL), or star-delta starter.
8. Connection and measurement of power consumption of a fluorescent lamp.
9. Determination of open circuit characteristics (OCC) of a DC Machine.
10. Starting and speed control of a DC shunt motor.
11. Connection and testing of a single-phase energy meter (unit power factor load only).
12. Two-wattmeter method of measuring power in three-phase circuit (resistive load only).
13. To get familiar with the working knowledge of the following instruments:
 - (a) Cathode ray oscilloscope (CRO).
 - (b) Multimeters (Analog and Digital)
 - (c) Function generator
 - (d) Power supply
14.
 - (a) To measure phase difference between two waveforms using CRO
 - (b) To measure an unknown frequency from Lissajous figures using CRO
15.
 - (a) Plot the forward and reverse V-I characteristics of P-N junction diode
 - (b) Calculation of cut-in voltage
 - (c) Study of Zener diode in breakdown region
16. To plot and study the input and output characteristics of BJT in common-emitter configuration
17. To find frequency response of a given amplifier and calculate its bandwidth
18. To get familiar with pin-configuration of typical op-amp (741) and its uses as:
 - (a) Inverting amplifier
 - (b) Non-inverting amplifier
 - (c) Summing amplifier
 - (d) Difference amplifier
19. Use of op-amp as
 - (a) Integrator
 - (b) Differentiator
20. To assemble Wein Bridge oscillator circuit and calculation of oscillation-frequency and its verification from the observed output
21. To assemble and test 5V/9 V DC regulated power supply and find its line-regulation and load-regulation

Note: Students are required to perform at least 10-experiments out of the above list.

Introduction: Engineering Graphics/Technical Drawing –a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments, Application of Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to dimensioning, Concepts of scale drawing, Types of scales.

Theory of Projections: Relevance of projection, Theory of projections, Perspective, Orthographic, Axonometric and their basic principles, system of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

Projection of Points: Projection in quadrants and octants, Projection of point on auxiliary planes.

Projection of Lines: Parallel to both H P and V P, Parallel to one and inclined to other, Contained in profile plane, Other typical cases: three view projection of straight lines, true length and angle orientation of straight line: rotation method and auxiliary plane method, Distance between two non-intersecting lines, trace of line.

Projection of Planes: Difference between plane and lamina, Projection of lamina, Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, Plane oblique to three reference planes, application of auxiliary planes, trace of planes.

Projection of Solids: Definition of solids, types of solids, and elements of solids, Projection of solids in first or third quadrant, Axis parallel to one and perpendicular to other, Axis parallel to one inclined to other, Axis inclined to both the principle plane, Axis perpendicular to profile plane and parallel to both H P and V P, visible and invisible details in the projection, Use of rotation and auxiliary plane method.

Section of Solids: Definition of Sectioning and its purpose, Procedure of Sectioning, Illustration through examples, Types of sectional planes-application to few examples.

Intersection of Surfaces/Solids: Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.

Development of Surface: Purpose of development, Parallel line, radial line and triangulation method, Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, Development of surface.

Isometric Projection: Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and drawing, Isometric projection of solids such as cube, prism, pyramid and cylinder, Discussion on isometric projection of simple machine parts.

Orthographic Projection: Review of principle of Orthographic Projection, Examples of simple machine parts, Drawing of Block and machine parts.

Books Recommended

1. Narayana K L and Kanaiah P, “Engineering Graphics”, Tata McGraw Hill Publishing company Limited, New Delhi (1992).
2. Gill P S, “Engineering Graphics and Drafting”, Katria and Sons, Delhi (2001).
3. Bhat N D, “Elementary Engineering Drawing-Plane and solid Geometry”, Chartotar Publishing House, Anand (1988).
4. Luzzadde Warren J, “fundamentals of Engineering Drawing”, Prentice Hall of India Private Limited, New Delhi (1988).
5. Bertoline G R , Wiebe E N, Miler G L L & Mother J L, “Technical Graphics Communication”, Irwin McGraw Hill, New York (1997).

Part –I: Mechanics Solids

Introduction: System of forces, coplanar concurrent force system, Composition and Resolution of force, Equilibrium of rigid bodies, free body diagram, Lami's Theorem.

Analysis of Framed Structure: Reaction in beam with different end conditions, Determination of reactions in members of trusses: a) Analytical Methods b) Graphical Method.

Centre of Gravity and Moment of Inertia: Concept of C.G. and Centroid, Position of Centroid, Theorem of Parallel and Perpendicular Axes, Moment of inertia of simple geometrical figures.

Stress and Strain: Concept of Stress and Strain, Simple Stresses, Tensile, Compressive, Shear, Bending and Torsion, Stress-Strain Curves, Elongation of bars, Composite bars, Thermal Stresses, Elastic Constants, Mohr's Circle.

Part-II Thermal Science

Basic Concepts: Introduction and scope of Thermodynamics, Thermostatistics, Thermodynamic properties, Cycle integral for property and non-property variable, Stored and transit forms of energy, Thermodynamic systems and control volume, Isolated system, Universe, Steady flow system, their characteristics and examples, Types of work, Thermodynamic Processes.

Laws of Thermodynamics: Zeroth Law, First Law of Thermodynamics, Second Law of Thermodynamics, Carnot Theorem, Concept of entropy, availability and irreversibilities.

Pure Substances: Behaviour of pure substances, Properties of steam and their calculations, Vapor power cycle-Rankine vs. Carnot, modified Rankine cycle.

Air Standard Cycles: Assumptions, Analysis of Otto, Diesel, Dual and Joule cycles, Calculation of cycle work and state values.

Introduction to Heat Transfer, Refrigeration and Air-Conditioning.

Books Recommended

1. Timoshenko S P and Young D H, "*Engineering Mechanics*", McGraw Hill (International) 4/e, New Delhi (1984).
2. Beer, Ferdinand; Johnston, Jr., E. Russell, "*Vector Mechanics for Engineers: Statics (in SI Units)*", 3rd Edition Tata McGraw Hill, 2000.
3. R C Hibbeler, "*Engineering Mechanics: Statics (in SI Units)*", Pearson Education, India, 2000.
4. Rogers G and Mayhew Y, "*Engineering Thermodynamics*", 4th Ed., Pearson Education, New Delhi (1980).
5. Jones J B and Hawkins J A, "*Engineering Thermodynamics*", John Wiley and Sons, Delhi (1998).
6. Nag P K, "*Engineering Thermodynamics*", Tata McGraw Hill Book Co, New Delhi (1999).
7. Joel R, "*Basic Engineering Thermodynamics*", 5th Ed., Addison Wesley, New Delhi (1999).
8. Sonntag R E, Borgnakke and Van Wylen G, "*Fundamentals of Thermodynamics*", John Wiley, New Delhi (2000).

(a) Strength of Materials:

1. Determination of Young's modulus, Yield Point, tensile strength, percentage reduction in area and percentage elongation for steel, aluminum, brass and cast iron specimens on universal testing machine. Also plot the stress strain diagram.
2. To perform the compression test for cast iron specimen on universal testing machine.
3. To determine the deflection for mild steel specimen and verify the beam formula for specimen in bending.
4. Determination of shear strength for steel and aluminum specimen under torsion using a torsion testing machine.

(b) Thermal Science:

1. To find the thermal conductivity of the composite wall.
2. To determine heat transfer coefficient in natural and forced convection using pin fin apparatus.
3. To determine the emissivity of a given plate at different temperatures.
4. Study of Two and Four stroke I.C. Engines.

Unit 1st : Classification of Microorganisms

Classification, Identification and Nomenclature

Unit 2nd : Morphological, Structure and Biochemical Characteristics of Prokaryotes and Eukaryotes

Difference between Prokaryotes Cell and Eukaryotic Cell with Schematic representation, Major Characteristics of Microorganisms : Bacteria, Fungi (Mold and Yeast), Algae, Protozoa and Virus.

Unit 3rd: Microbial Nutrients and Growth Media

Bacteria, Fungi (Mold and Yeast), Algae, Protozoa and Virus.

Unit 4th: Microbial Reproduction and Growth

Bacteria, Fungi (Mold and Yeast), Algae, Protozoa and Virus

Unit 5th: Method in Microbiology

Pure Culture Technique, Sterilization (Media and Air), Enrichment Culture Techniques for isolation of Microorganisms, Microscopes including Staining Techniques, Mutation.

Unit 6th: Nutrient Transport across Cell Membrane

Active Transport, Passive Diffusion, Facilitated Diffusion and Group Translocation.

Unit 7th: Structure and Function

Carbohydrates, Proteins, Amino Acids and Peptides, Nucleic Acids and Nucleotides, Lipids and Enzymes.

Manufacturing: Introduction to manufacturing processes, Basic terminology used, Economical and technological considerations.

Materials properties and their application: Different engineering materials, Properties, Nomenclature, Basics of heat treatment.

Carpentry: Introduction, Classification of wood, Seasoning of wood, Classification of carpentry tools, Joints and joining processes, Wood working machines and processes, safety precaution.

Fitting: Introduction, Tools used in fitting, Measuring and marking tools, the process of making sawing, Filing, Tapping and die, Introduction to drills.

Welding: Introduction, Various welding processes with brief introduction, Electric Arc welding, Arc welding procedure, List of equipment for electric arc welding, Gas welding process and equipment is in the process, Soldering and Brazing process.

Smithy: Introduction, Types of forging, Equipment used in the smithy shop, Smithy tools, Black smith's hearth, Hand forging operations.

Foundry: Introduction, Basic terminology, Pattern, Types of patterns, Patterns allowances, Tools for hand Moulding, Moulding sand and Moulding process, Crucible furnace, Operation of cupola, Foundry containers, Casting defects, Safety precautions.

Sheet metal working: Introduction, Types of sheets (ferrous/non ferrous), Standard sheet sizes and their measurement, Tools used in sheet metal.

Metal cutting: Introduction, Classification of machine tools and cutting tools, Basic operations on lathe, Drilling, Shaper, Milling, Cutting tool material, Work-holding devices, Cutting parameters i.e. speed, feed and depth of cut.

List of experiments

Carpentry shop	-2 jobs
Fitting shop	-2 jobs
Arc welding	-1 job
Gas welding	-1 job
Smithy shop	-2 jobs
Foundry shop	-1 job
Sheet metal working	-2 jobs
Machine shop covering various operations	-2 jobs
Electric shop	-1 job

Books Recommended

1. Chapman W A J, "Workshop Technology Part 1-3", 5th Ed., Viva Books Pvt. Ltd. New Delhi (1998).
2. Hajra Chowdary S K and Hajra Chowdhay A K, "Work Shop Technology" 10th Ed., Media Promoters and Publishers.
3. Raghuwanshi R S , "Work Shop Technology", 9th Ed., Dhanpat Rai and Sons, New Delhi.
4. Jain R K, "Production Technology", 5th Ed., Khanna Publishers, New Delhi (1995).
5. **Linberg R A "Process and materials of Manufacturing", 4th Ed., Prentice Hall of India, New Delhi (1999).**

1. **Psychological Perspectives and Approaches:** Nature and Scope of psychology; historical perspective; sub-fields and applications; methods of psychology.
2. **Perception:** Sensory and perceptual processes; pattern recognition; attention; perception of objects, space and time; feature and attribute perception; perceptual organization; plasticity of perception; illusions; states of consciousness.
3. **Learning:** Models and theories of learning; learning paradigms; skill acquisition and transfer of learning; language acquisition.
4. **Memory:** Functions and processes; models and theoretical views; influences on memory processes; neuro-physiological perspective; aspects of memory deterioration and improvement.
5. **Higher Cognitive Processes:** Language and thought; problem solving; decision processes.
6. **Motivation and Emotion:** Physiological and cognitive bases of motivation; expression and perception of emotions; physiological correlates and theories of emotion.
7. **Intelligence:** Nature of intelligence; theories and models of intelligence; psychological tests and assessment of intelligence; Issues in intelligence testing; creativity.
8. **Personality:** Nature and theories of personality; personality assessment; determinants of personality; psychological conflict and conflict handling mechanisms.
9. **Individual Differences:** Genetic and environmental bases of individual differences in human behaviour.

Total number of lectures 45

Textbooks:

1. Morgan, c.T., King, R.A., Weisz, J.R. and Schopler, J. Introduction to Psychology. Singapore: McGraw Hill.
2. Atkinson, R.L., Atkinson, R.C., and Hilgard, E.R. Introduction to Psychology. Harcourt Brace Jovanovich Inc.
3. Baron, R.A. Psychology. New Delhi: Prentice Hall of India.

1. **Nature of Management:** Definition, function, process and significance of management, management vs administration, management science or art, universality of management, management as a profession, professionalization of management, management by objectives.
2. **School of Management Thought:** Contribution of Henry Fayal, F.W Taylor, Elton Mayo, Peter F, Druckers, Dogulas Megregor, system approach, contingency or situational approach of management
3. **Function of Management:**
Planning, meaning, characteristics, significance, steps in planning, types of plans.
Organizing:- definition, nature, process, significance, departmentation.
Directing:- leadership, styles of leadership, rensis likerts management system, theories of leadership.
Motivation:- definition, types, significance, motivation theories- AH. Maslow, Fredrick Herzberg & their relation.
Controlling :- meaning, characteristic, control process, control areas, essentials of effective control, importance.
4. **Decision Making:** Definition, types of decision, its importance & significance, decision making process, strategic & tactical decision, decision support system.
5. **Coordination:** Definition, features, importance & significance, technique of coordination.
6. **Production planning/ Production system:-** Production planning & control, elements, objects & function of production planning & control, production cycle, production system, quality circle, total quality management.

Books Recommended

1. Koontz. Hand Weihrich H, "Essentials of Management", 5th Ed., Tata McGraw-Hills, New Delhi (1998)
2. Prasad L M, "Principles and practices of Management", 5th Ed., Sultan Chand and Sons, New Delhi (1999)
3. Stoner J A F, Freeman R E and Gilbert D R, "Management", 6th Ed., Prentice Hall of India, New Delhi (2002)
4. Singh R N, "Management Thought and Thinkers", 2nd Ed., Sultan Chand and Sons, New Delhi (1999)

1. **Communication:** Meaning, its types, significance, process, Channels, barriers to communication, making communication effective, role in society.
2. **Business Correspondence:** Elements of business writing, business letters, components and kinds, memorandum, reports writing, purchase order, quotation and tenders, job application letters, resume writing etc.
3. **Discussion Meeting and Telephonic Skills:** Group discussion, conducting a meeting, attending telephonic calls, oral presentation and role of audio visual aids.
4. **Grammar:** Transformation of sentences, words used as different parts of speech one word substitution, abbreviations, technical terms etc.
5. **Reading Skills:** Process of reading, reading purposes, models, strategies, methodologies, reading activities.
6. **Writing Skills:** Elements of effective writing, writing style, scientific and technical writing.
7. **Listening Skills:** The process of listening, the barrier to listening, the effective listening skills, feedback skills.
8. **Speaking Skills:** Speech mechanism, organs of speech, production and classification of speech sound, phonetic transcription, the skills of effective speaking, the components of effective talk.

Books Recommended

1. Rodrigues M V, "Effective Business Communication", Concept Publishing Company New Delhi, 1992 reprint (2000)
2. Bhattacharya. Indrajit, An Approach to Communication Skills. Dhanpat rai Co., (Pvt.) Ltd. New Delhi
3. Wright, Chrissie, Handbook of Practical Communication Skills. Jaico Publishing House. Mumbai
4. Gartside L, Modern Business Correspondence. Pitman Publishing London
5. Day, Robert A., How to Write and Publish a Scientific Paper. Cambridge University Press Cambridge
6. Gimson A C, "An Introduction to the Pronunciation of English", ELBS. (YP)
7. Bansal, R K and Harrison J B "Spoken English", Orient Longman Hyderabad.

1. Business Letters:

- Structure of business letters, language in business letters.
- Letters of inquiry & their places.
- Sales Letters
- Memorandum, Quotations/tenders
- Bank correspondence
- Letters of application and appointments
- Resume writing

2. Report Writing**3. Conducting a Meeting****4. Minutes of Meeting****5. Oral Presentation****6. Group Discussion**