Barkatullah University Institute of Technology, B.U., Bhopal

ENGINEERING MATHEMATICS (CE-101)

Unit I

Maclaurin's and Taylor theorem, Roll's theorem, mean value theorem, application to rates small increments approximations and errors.

Unit II

Tangents and sub tangents normal and subnormal differential and coefficient of arc length in Cartesian. Polar and parametric coordinates curvature definition formula in intrinsic Cartesian and polar coordinates, radius of curvature and center of curvature.

Unit III

Asymptotes, envelopes, evolutes, Indeterminate forms partial differentiation, Euler's theorem application of partial differentiation in approximately and errors of Taylor's series of two variables maxima and minima of functions of one and two variables.

Unit IV

Definite integrals and their properties Integral as the limit of a sum application to summation of series Area, length of curves volume and surface of solids of revolutions.

Unit V

Beta and gamma function multiple integral, double integral and triple integral application to problem in area, volume center of gravity moment of inertia and center of pressure.

Books:

Higher engineering mathematics by B.S. Garewal

Text book of Engg. Mathematics by Shrivastava and Dhawan.

Engineering mathematics by chandrika prasad

Engineering Mathematics Volume I by Ashok Ganguly, R.S Chandel Ram Prasad & Son.

Advanced Engineering Mathematics by H.K.Dass

ENGINEERENG CHEMISTRY (CE-102)

UNIT-I

WATER

Sources & impurities, Alkalinity & pH Hardness of water, Degree of hardness, Dissolved oxygen and their determination, standards of water for drinking purposes, purification of water for domestic use, methods of sterilization. Methods of water softening, Lime Soda process, Zeolite & ion exchange resin processes, Sludge & scale formation causes, effects and prevention, Caustic embrittlement. priming, foaming, boiler Corrosion and deareation, simple numerical problems on water softening and water analysis.

Unit – II

Fuels

Classification of fuels and their Comparison. Calorific values, fuel resources in India, analysis of coal, clinker formation, pulverized coal as fuel, methods of manufacture of coke and its uses, petroleum distillation, Cracking, Cracked gasoline, Varieties of fuel oils, their properties and uses, knocking, anti knocking Compound!, Problems based on combustion, Air and oxygen calculation.

UNIT-III

MATERIALS:

Composition engineering properties and uses of alloys of Al, Fe, *Ni,* Cu and Zn.

Refractories: Definition, Classification. Properties and uses, Types of Cements, manufacture, properties and uses of Portland cement, Chemistry of setting and and hardening of Cement.

Polymers: Polymerization, different types of Polymers, plastics their preparation, engineering properties and uses, Silicones, Natural and Synthetic rubbers, their properties and uses, Adhesives.

UNIT – IV

LUBRICANTS

Types and classification of lubricants, mechanism of lubrication. Physical and Chemical properties, testing of lubricants, Types of greases, application. of lubricants.

Corrosion and Corrosion reactions, types and theories of Corrosion, factors affecting the rate of Corrosion, protection of metals, Iron Corrosion by Various measures, important Inorganic metallic and non-metallic Coatings and organic-Coatings.

UNIT-V

BASIC ENVIRONMENTAL CHEMISTRY

A. Pollution: Causes of pollution, Air pollution and its types, Green House

Effect importance of ozone layer, control of air pollutions, water pollution sources, methods of prevention , soil or land pollution and its control radioactive pollution and its control.

B. Instrumental techniques in chemical analysis. Introduction , Infrared Ultra violet, Nuclear magnetic, Reasonance, Spectrophotometry, Chromatography, Gas- Chromatography, Colorimetry, Lambert's Beer's law.

Books:

1. **Engineering chemistry by Jain & Jain**
2. **Engineering chemistry by S S Dara**
3. **Engineering chemistry by B K Sharma**
4. **Applied chemistry for engineers by E.S. Gyngell.**

5. Chemistry of engineering materials by Robert B. Leighu- Mcgraw Hill Book Co.

ENGINEERENG CHEMISTRY (CE-102)

LIST OF EXPERIMENTS

I. Qualitative Analysis:
(Preparation of standard solution)

1. Oxidation-reduction titration. Estimation of percentages of iron using Potassium dichromate, internal and external indicator methods.
2. Iodometric Estimation of
   (i) Copper Sulphate
   (ii) Potassium dichromate.
3. Water Analysis:
   a. Determination of carbonate and bicarbonates in water.
   b. Determination of total hardness in water using soap or EDTA Titrations.
   (iii) To determine the chloride contents in water.

II. FUELS:

(i) Determination of percentage of moisture on coal.
(ii) Determination of percentage of Ash in coal or coke.
(iii) Determination of percentage of Volatile matter in coal.
(iv) Determination of carbon residue in lubricating oils by Conrad-son Apparatus.

III. LUBRICANT TESTING:

(i) Determination of Viscosity index of lubricating oils.
   (a) Red Wood Viscometer No. 1.
   (b) Red Wood Viscometer No. 2.

BOOKS:-

1. **A text book on experiments and calculations in Engineering Chemistry-S.S. Dara.**
2. **Lab manual –S.Amlathe.**

COMMUNICATION SKILLS (CE-103)

Unit I

Languages as a skill of communication linguistic techniques, modern usage & style comprehension skills, English phonetic symbols, Oral presentation, audition.

Unit II

Application of linguistic ability, writing of definitions of engineering terms, objects, processes and principles.

Unit III

Letter writing, Application, Enquiry, calling Quotations, Tenders, Orders & Complaint, Company structure and systems.

Unit IV

Precise writing, noting and drafting, technical descriptions of simple engineering objects & processes, slogan writing, advertising, book review.

Unit V

Writing technical reports of the type of observation – report, survey report , report of trouble, laboratory report and project report on the subject of engineering, debates, speech, discussion.

Books

1. Business correspondence & Report writing- by R. C. Sharma & Krishna Mohan
2. Living English Structure – By W. Stannard Allen, Longmans.
3. Students Grammar- By Dev Willys Collins (Harper)
4. Spoken English For India – R K Bansal & Harrison (Orient Longman)

BASIC MECHANICAL ENGINEERING (CE- 104)

UNIT - I

Boilers- Names and functions of principal parts, Cochran, Locomotive, Lancashire, Babcock and Wilcox boilers, boiler mountings and accessories.

Steam-Sensible heat, latent heat, super heat, internal energy, dryness fraction and its determination, Processes-constant pressure, constant volume, hyperbolic and throttling.

UNIT- II

IC engines -Classification of IC Engines, description and working of four stroke cycle petrol and diesel engines, two stroke cycle petrol engine and their working cycles, indicated power, brake power and efficiencies.

Thermodynamics-system, properties and processes, zero, first, second and third law of thermodynamics.

UNIT-III

Modes and applications of heat transfer, unidirectional steady state heat conduction, heat transfer through composite slab, Air conditioning-need and application, description of summer and winter air conditioning.

WORKSHOPTECHNOLOGY:-

UNIT - IV:-

Introduction to materials, machine tool and metrology:

Engineering Materials: Classification, composition, mechanical properties and uses of. Cast iron, mild steel, high carbon steel and high speed steel corrosion and prevention

Machine tool: Introduction specification and uses of lathe, drilling, shaper, milling and grinding machines.

Measurement: construction and uses of measuring tools and dial gauge, surface plate sine bar, caliper, micrometer, comparators.

Unit – V

FOUNDRY AND FABRICATION:

Foundry: - Basic steps involved in foundry. Introduction to patterns, types, material allowances, mould making, composition of molding sand i.e. green sand, dry and loam carting defects sand, classification of welding, edge prep joint design welding symbols.

Fabrication: Welding and weld ability of metals. Introduction to gas and arc welding - TIG, MIG and submerged, resistance welding, soldering and brazing and related processes welding defeats.

Books:

Manufacturing Technology – Vol-I and Vol-II – Raghuwanshi
Workshop Technology Vol-I & Vol-II – Hazara chaudhary
Workshop Technology Vol-I & Vol-II P.N. Rao
Workshop Technology – Vol – I & Vol-II by Waj chapman
Thermal engg. By Pandey & Shah
Thermal engg. By R.K. Rajput.

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Thermal engg. By Domkundwar.Dhanpat Rai & Co.
Thermodynamics-By P.K.Nag-Tata Mcgraw Hill

BASIC MECHANICAL ENGINEERING (CE- 104)

List of experiments

1. Study of Boilers.
2. Study of Boiler Mountings & Accessories
3. Study of Cochran boiler
4. Study of Locomotive Boiler.
5. Study of Lancashire Boiler.
6. Study of Babcock & Wilcox Boiler.
7. Study of Two-Stroke Petrol Engine.
8. Study of Four-Stroke Petrol Engine.
9. Study of Four-Stroke Diesel Engine.

BASIC CIVIL ENGINEERING (CE-105)

Unit – I

Engineering Materials

Stones, Bricks, Mortar and concrete – Types, properties and uses, proportioning mixing curing and tests with reference to RCC.

Unit – II

Building Construction

Foundation – Types of foundation, investigations of soils. Bearing capacity of soils, foundation failure and remedial measure. Masonry types and construction of masonry walls.

Unit – III

Principles of building planning, orientation floors, roots, doors windows, lintels and staircases types and suitability, plastering and pointing dampness and its protection.

Unit – IV

Surveying

General principles of surveying – chain survey, compass survey, plane table surveying – principles accessories and various methods.

Unit – V

Leveling: Types of Leveling and various methods Theodolite Introduction.

Suggested Text books and references

1. Engineering Materials by surendra singh.
2. Building construction by Sushil kumar
3. Surveying vol-I by B.C. Punmia
4. Surveying vol – I by T.P. kanetkar.

LIST OF EXPER1MENTS

1. To find out the area of closed field through cross staff survey.
2. To perform traverse survey by using surveyor's compass.
3. To perform traverse survey by using Prismatic compass.
4. To perform leveling by Height of instrument method.
5. To perform leveling by Rise and Fall method.
6. To plot a closed traverse by plane table survey.
7. Study of Theodolite.

WORKSHOP PRATICE (CE - 106)

1. FITTING SHOP & ADVANCE FITTING

a) Metal bench work
b) Measuring instruments, engineers steel rule, surface gauges calliper.Hermaphrodite caliper (Jenny Calliper), dividers, height gauges; feeler gauges, try square and micrometer.
c) Use, care and maintenance of hand tools such as hammers, cold chisel of different types, center punch, hack-saw, dot punch, drift, different types of files, file cuts, files grades .Use of surface palate, surface gauges, types of drills ,taps and dies for drilling tapping and screw threads .
d) Fitting operations: Chipping, Filling, Drilling, and Tapping.

Two jobs to cover above course such as:

1) Preparation of job piece by making use of filling, sawing, and chipping operation.
2) Job having combined pratice of drilling and tapping.
3) Job having combined pratice of drilling and reaming.

2. BLACKSMITHY SHOP

a) Smithy maintenance ,control of fire and fuel used in smithy shop.
b)Uses of various smithy tools such as Swage block, Anvil, different types of Hammaers,Tongs,Flatters,Coldset,Hotset,Herdicswages,fullers,set Hammers,Punches,Drifts and Rivet headers(revet snaps) etc.
c) Use of measuring foot rule, Calipers(outside and inside) Templates and used in forging.
d) Introduction to Forging and Forging methods
e) Heating metals for forging.
f) Forging Operations.

Upsetting, Drawing Down, Fullering, Swaging, Platening, Cutting Down, Forge welding, Punching and Drifting.
Two jobs to cover above courses such as:
1)Forging of chisel.
2) Forging of Ring.
3) Forging of Pan hook (s-shaped).
4) Forging of screw driver
5)Forging of Hexagonal nuts & Drifting

3. MEASUREMENT & QUALITY INSPECTION.

Construction and uses of measuring tools and gauges, surface plates, dial gauge, sine bar, Calliper, micrometers, comparators.

Fundamental of interchangeability, limits, fits and tolerances.

4. CARPENTARY SHOP

1.Timber:Type, qualities of timber, timber dries, timber grain, structure of timber, timber seasoning, timber preservation. Approximate conversion & Market forms of timber.

2.Wood working tools: Wood working machinery, & joints & joinery.

3.Various operations of planning various carpentary planes sawing and making of various carpentary joints.

Two jobs to cover above courses such as

a) Name Plate
b) Carpentry joints such as cross halving joint, mortise and tenon joint, Dovetail joint etc.
c) Dwelling Plates
d) Wall Bracket.

ENGINEERING PHYSICS (CE-201)

UNIT -1: WAVE OPTICS

Theory of Biprism and Newton's Rings experiments, Michelson's Interferometer. Diffraction at single slit, double slit and diffraction grating. Resolving power, Rayleigh criterion, Resolving powers of telescope, microscope, grating and prism, concept of polarized light. Nicol prism. Idea about circularly & elliptically polarized light.

UNIT - 2 : QUANTUM PHYSICS

88Matter waves, group and particle velocity, uncertainty principle, Schrödinger wave equation and its application. Characteristic and back ground X-rays, Duan Hunt Limit. Mosley's Law. Bragg's diffraction and Bragg's spectrometer, Compton Effect Stimulated and spontaneous emission, principles of Laser action. Properties of solid state (Ruby & Nd YAG) and gas (He-Ne & CO_2 *type* lasers and their engineering applications. Fundamental ideas about fiber optics.

UNIT – 3: NUCLEAR PHYSICS

Static properties of Nuclear shell model and liquid drop model. Particle accelerator. Cyclotron, Synchrocyclotron & Betatron, Nuclear reactions and Q values. Nuclear cross-section. Nuclear Fission, Fission energy. Theory of fission process. Chain reaction. Critical size. Principles of Nuclear reactor and nuclear fusion. Control fusion and fusion reactor.

UNIT - 4: RAY OPTICS

Cardinal points of a co-axial lens system. Nodal slide and its application in the verification of lens formula for the combination of two lenses and in the determination of cardinal points. Spherical and chromatic aberrations. Rams don & Huygen's eye pieces. Gallelian telescope, Sextant and its uses.

UNIT -V: THERMAL PHYSICS

Liquification of gases. Porous plug experiment and Joule-Thomson effect. Rectilinear flow of heat. Theory of Ingen-Hauz's experiment. Forbes method, Lee's disc method for bad conductors and liquids.

Solar Constant Stefan's radiation law and its verification. Radiation Pyrometer. Principles of harnessing solar energy. Fundamental ideas about superconductivity Meissner effect, Isotope effect, Josephson Effect.

Books:

1. A text book of engineering physics, by M.N. Avadhanulu & P.G. Kshirsagar, pub. S.chand & Company LTD
2. Optics by Ajay Ghatak, pub. Tata Mcgraw Hill.
3. Engineering physics by S.K. Srivastava & R.A. Yadav., Pub. New age International (p) ltd.
4. A Textbook of engineering physics by Naveet Gupta & S.K. Tiwari, Pub. Dhanpat Rai & Co.
5. Physics for Engineers by M.R. srinivasan pub. New age international Publishers
6. Heat and Thermodynamics by Brij Lal & N. Subrahmanyam Pub. S.chand.

ENGINEERING PHYSICS (CE-201)

List of Experiments

(1) Transistor characteristics.
(2) Semi conductor diode characteristics.
(3) Band gap in semiconductor diode.
(4) A.C. Mains.
(5) Stoke's law.
(6) N.S. Assembly.
(7) L.B. Photometer.
(8) Newton's Ring.
(9) λ-by grating.
(10) μ-by Prism.

BASIC ELECTRICAL AND ELECTRONICS ENGG. CE- 202)

Unit - I

Introduction to Electrical Engg. Generation, transmission, Distribution, & utilization.

DC circuits: Maxwell's loop & node equations, Source conversion, Network theorems, Super position theorem, Maximum power transfer theorem, Millman's theorem. Reciprocity theorem, Star/ Delta transformation.

Magnetic circuit and electrostatics: Fundamental definition, Ampere's law, Lenz's low, calculation of MMF, Comparison of electric, magnetic & electrostatic fields, statically & dynamically induced emfs, Lifting power of magnet

Unit - II

Single phase AC. Circuits:

Average value, RMS value, Form factor, Peak factor, Alternating waves, power and power factor, single phase series-parallel circuit, Resonance, Phase diagram.

Polyphase AC circuits: Phase sequence, Concept of line & phase quantities, star-delta. Connections, three phase power and power measurement

Unit - III

Transformer: Construction, principle, types, emf equation, phasor diagram of transformer on no-load and on-load, equivalent circuit, efficiency, regulation, open-circuit and short circuit test welding transformer, three-phase transformer. Rotating

Unit- IV

Electric Machines:

DC Machines & generators ,construction and principle of operation, classification, emf equation, armature reaction characteristics.

Motor-Principle of operations,Torque Equation, Load characteristics, control Efficiency.Application

Unit V

Electronic devices: Principles and construction of semi conductor devices, zone diodes, photo diodes, BJT, UJT, Photo transistors, CRO,UJT Relaxation Oscillator

BOOKS:

1. Electrical Engg. Fundamentals - V. Deltoro (Prentice Hall of India)
2. Electrical Machines - Nagrath Kothtri (Tata McGraw Hill)
3. Electrical Machines - P.S.bhimbhra.(Khanna Publishers)
4. Basic Electrical Engg. - V.N.Mfttte.
5. DC Machines & transformers - K. Murugesh Kumar (Vikas Publication)

BASIC ELECTRICAL AND ELECTRONICS ENGG. (CE- 202)

LIST OF EXPERIMENTS

A. Study of various measuring instruments.
B. Study of various parts of D.C. machine.
C. Study of 3-point and 4-point D.C. motor starters
1. a. To study the variation of resistance with temperature,
   b. To study fuse law and determination of fusing current
2. Calibration of M.C. Ammeter and M.I. voltmeter.
3. Verification of super position theorem
4. To study speed-control of D.C. shunts motor
5. To perform open-circuit and short-circuit test on a 1.$ transformer, hence to plot equivalent circuit
6. Determination of magnetization characteristic of separately excited D.C.Generator
7. To performer ratio, polarity and load test on a single phase transformer.
8. Study of A.C. series RLC circuit, and power and power factor measurement
9. Measurement of power by three voltmeter method.

FUNDAMENTALS OF COMPUTER AND PROGRAMMING (CE- 203)

UNIT I

General organization of typical computer, classification of computers, generation of computer.,Input-output devices, Storage devices, System software like assemblers, Compilers.

UNIT II

Operating systems, Introduction to UNIX. Simple UNIX commands like date. Who, Cal, tty, Is etc. file commands like .me, cp, cat. etc. Directory commands like pad, Mkdir, Rmdir, cd etc. other commands like echo. Man etc. Modifying files using vi editor, compare UNIX and DOS, Generation of programming language.

UNIT III

Problem specification, Flow chart and algorithm development, structured, programming, object oriented programming and its advantages. Data types. Assignment statements, unary, binary and tertiary operator Input-output statements. Developing simple C programs, If statements, loops (for, while, do while), Break & continue, Switch statements, Development of C Programs using above statements.

UNIT IV

Array, functions, Parameter passing. Recursion. Programming in C using these statements Preprocessors directives and. 1 macros storage classes, scope, of variables.

UNIT V

Structures, Pointers, Files handling using init86() function, union. Enumerated data type, command line argument, working with user defined header file.

Books:-

1. Unix by Summitabha Das.-TMH
2. " C "programming by E Balaguruswamy -TMH
3. Complete reference of "C".—Herbert Schildt- TMH
4. Fundamental of computer by V Rajaraman TMH

FUNDAMENTALS OF COMPUTER AND PROGRAMMING (CE- 203)

List of Experiments

(1) Write a function that will scan a character string passed as an argument and convert all lower case characters into their upper case equipments.
(2) Write a program to replace a particular word by another word in a given string.
(3) Write a program to generate the Fibonacci number series 0,1,2,3,5,8,13,21……(20 such terms).
(4) Using pointers write a function that receives a character string and a character as argument & delete all occurrences of this character in the string.
(5) Two files DATA1 & DATA2 contain sorted file DATA which holds a single sorted, merged list of these two lists. Use common link arguments to specify the file names.
(6) Write a program that will read a positive integer and determine & print its binary equivalent.
(7) Write a program to read two numbers n and as inputs and then calculate the value of nCr∟ n/∟r∟ n-r; npr=∟ n/Ln-r. Use factorial function for this purpose.
(8) Write a program to read two matrices. A and B and then calculate the product of the matrix in C. Finally print the C matrix.
(9) Write program for some Engineering Formulae.
(10)Generating graphics from formula for parameters study.

ENGINEERING MECHANICS (CE-104)

Unit – I

Coplanar forces, free body diagram, varignon's theorem. Condition of equilibrium force polygon and funicular polygon of forces. Equivalent force system. Analysis of forces in the members of perfect trusses. Method of joints, Methods of sections.

Unit – II

Centroid, moment of inertia of plane areas, perpendicular axis and parallel axis theorems, product of inertia. Radius of gyration principal axes and principal of inertia. Mass moment of inertia.

Unit – III

Friction on inclined plane, screw jock, Ladder and wedge friction. Transmission of power through belt and rope. Gear trains, simples compound and epicyclic.

Unit – IV

Kinematics and kinetics of particle, super elusion of rails momentum and impulse, D-Alembert's principle, work energy principle, collision of elastic bodies. Rigid Body dynamics kinematics and kinetics of rigid body, flywheel.

Unit – V

Shear force and bending moment diagram in cantilever and simply supported beams subject to concentrated and uniformly distributed loads and couples, over hanging beams point of contra-flexure, Relation ship between load, shear force and bending moment.

Suggested Text Book and References

1. Applied Mechanics by S.B. Junnarkar – S. Chand Publication
2. Engg. Mechanics by R.K. Rajput. – Dhanpat Rai Publication
3. Engineering Mechanics by Singer. – AWL Publication
4. Applied Mechanics by I.B. Prasad. - Dhanpat Rai Publication
5. Mechanics of Engg. (Statics) by Bear and Johnson. – TMH Publication
6. Engineering Mechanics by T J Prabhu – Scitech Publication

ENGINEERING MECHANICS LABORATORY EXPERIMENT (CE 104)

1. To verify the law of polygon of forces and the law of funicular polygon of forces by using force table.
2. To verify principal of lever by using Bell Crank lever.
3. To determine the Centroid of plane areas experimentally and verify analytically.
4. To find the coefficient of friction between glass wood and glass brass by using inclined plane.
5. To find the moment of inertia of flywheel by falling weight method.
6. To find the reactions in parallel force apparatus experimentally and analytically.
7. To determine bending moment at the centre of the beam for various load position and verify analytically.
8. To verify law of triangle of forces by using Jib-Crane model.
9. To find coefficient of friction between belt & pulley and rope & pulley.
10. To find velocity ratio, efficiency, mechanical Advantage and law of machine for a screw Jack.

ENGINEERING GRAPHICS

UNIT – I

Scales : Representative factor, plain scales, diagonal scales, scale of chords.

Conic Section : Construction of ellipse, parabola and hyperbola by different methods. Normal and Tangent

Special Curves : Cycloidal, Epi-cycloid, Hypo-cycloid, Involutes, Archemedian and logarithmic spirals.

UNIT – II

Projection : Types of projection, orthographic projection, first angle and third angle projection, projection of points and lines, True inclinations and true length of straight lines, Traces of straight lines, Auxilliary planes.

UNIT – III

Projection of plains and solids, Projection of plains, Projection of polyhedra, Pyramids, Cylinder, Cone and Sphere.

UNIT – IV

Section of solids: section of right solids by normal and inclined planes.

Development of Surfaces : Parallel line and radial line method for right solids. Method of triangulation for oblique pyramids, Cones and transition pieces.
Intersection of surfaces : Intersection of prisms, pyramids, cylinder, cone, line method, cutting plane method.

UNIT – V
Isometric projections : Isometric scale, Isometric axes, isometric projections of planes and solids, orthographic, oblique and perspective projections of simple objects, reading of drawing, missing lines and views, sections & convention used in machine drawing according to IS code. Geometrical dimensioning and tolerancing. Machining symbols, drawing of simple components such as bearings and brackets.

Reference Books

Engineering Drawing – N.D. Bhatt
Engineering Drawing – Venugopal
Engineering DrawingGujral & Shende
Engineering Drawing – Laxminarayan & Vaishwakar
Engineering Drawing – Jeyapoovan
Engineering Drawing – P.S. Gill