

SEMESTER-I

MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester: 1st B.Tech

Branch: All Streams of Engineering

Subject: Engineering Mathematics-I

Code: BT 100

Total Theory Periods: 60

Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES:

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/ she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modelling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT-1: MATRICES: Rank & inverse of matrices by elementary transformation. Gauss Jordan method of finding the inverse of a matrix. Normal form of a matrix. Consistency and inconsistency of linear system of equations. Eigen values and Eigen vectors of a matrix. Cayley- Hamilton theorem.

UNIT-2 : Differential Calculus: Successive Differentiation, Leibnitz's theorem; expansion of functions in Taylor's and Maclaurin series; tracing of simple curves.

UNIT-3: Integral calculus: Reduction formula, application of integration to rectifications, Quadrature, volume of revolution, centre of gravity and moment of inertia.

UNIT-4: Partial Differentiation: Partial derivatives, Euler's theorem on homogeneous functions, maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers, Jacobians, differentiation under integral sign.

UNIT-5: Ordinary Differential Equations and Applications: Exact differential equations, reducible to exact form; first order differential equations (non linear); application to simple electrical circuits and heat flow. Theory of equations: Roots of polynomial equations, relations between roots and coefficients, transformation of equations, removal of terms, solution of cubic and biquadratic equations-Cardin's and Ferrari's method.

OUTCOMES:

- This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus.

TEXT BOOKS:

1. Higher Engineering Mathematics by B. S. Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.

2. Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
3. Applied Mathematics by P.N.Wartikar & J.N.Wartikar Vol-II –Pune Vidyarthi Griha Prakashan, Pune.
4. Integral Calculus by Gorakh Prasad-Pothisala Private Limited.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech

Branch: All Streams of Engineering

Subject: Basic Electrical Engineering

Code: BT 101

Total Theory Periods: 60

Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES:

- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To impart knowledge of communication

UNIT-I: D.C.NETWORKS

Basic electrical components, ohm's law, resistance in series, resistance in parallel, short and open circuit equivalent resistance. Kirchhoff's law, node voltage and mesh current methods, delta-star and delta/star conversion, classification of network elements, superposition theorem, Thevenin's and Norton's theorem.

UNIT-II : A.C. NETWORKS

Single phase AC circuits:-Solution of R.L.C. series circuit, the J operator complex representation of impedance, phasor diagram, power in complex notation, solution of parallel and series parallel circuits. Three phase AC circuits:-Delta and star connection, line and phase quantities, solution of Three phase circuits, balanced supply voltage and balanced load, phasor diagram.

UNIT-III: ELECTRO MAGNETISM

Magnetic circuits:-B-H Curve, Solution of magnetic circuit, Hysteresis and eddy current losses, difference / welect /magnetic circuit. Transformers:-Construction, EMF equation, rating, phasor diagram on no load and full load Equivalent circuit, regulation, losses efficiency all day efficiency calculation.

UNIT-IV : DC MACHINES Construction, EMF and Torque equation, classification and application and characteristics of DC motors. House wiring & safety:-Single phase and three phase system-phase, neutral and earth, basic house wiring, different types of wiring-staircase, florescent lamp and ceiling fan, basic safety measures at home and industry.

UNIT-V : ELECTRICALMEASURINGINSTRUMENTS

Classification Indicating, recoding and integrating types of instruments, controlling, torque, Damping torque, DCP MMC instruments, shunts and multipliers, moving iron ammeter, working principle of single phase energy meter.

OUTCOMES:

- Ability to identify the electrical components and explain the characteristics of electrical machines.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech

Branch: All Streams of Engineering

Subject: Technical English

Code: BT 102

Total Theory Periods: 45

Total Tutorial Periods: 00

Total Credits: 03

OBJECTIVES:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT-I: Technical vocabulary-meaning in context, sequencing words, articles, prepositions, intensive reading and predicting content-reading and interpretation- process description.

UNIT-II: Phrases/structures indicating use/purpose- non verbal communication- listening- correlating verbal and non verbal communication-speaking in group discussion- formal letter writing- writing analytical paragraphs.

UNIT III: Cause and effect expressions- different grammatical forms of the same word-speaking stress and intonation- writing using connectives- report writing- types, structures, data collection, content form recommendation.

UNIT –IV: Numerical adjectives- oral instructions- descriptive writings, letter of application-content, format (c.v./biodata)- imparative forms –checklists, yes/no question forms- e mail communication.

UNIT-V: Speaking – discussion of problems and solutions- creative and critical thinking, writing a proposal.

OUTCOMES:

Learners should be able to

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents

TEXT BOOKS AND REFERENCES:

1. P.K. Dutta, G. Rajeevan and C.L.N. Prakash, 'A course in communication skills, Cambridge University Press, India 2007.
2. Krishna Mohan and Meera Banerjee, 'Developing Communication Skills' Macmillan India Limited.
3. Edger Thrope, Showick Thrope, 'Objective English' Second Edition, Pearson Education, 2007.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech

Branch: All Streams of Engineering

Subject: Engineering Graphics

Code: BT 103

Total Theory Periods: 45

Total Tutorial Periods: 20

Total Credits: 04

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

UNIT – I: a) Importance of Engineering Drawing, Scales: Representative Fraction, Type of Scale, Plain and Diagonal Scale.

b) Engineering Curves: Conic section, Ellipse, parabola, hyperbola, Cycloidal Curves: Cycloid, Epicycloids, Hypocycloid, Involutess..

UNIT – II: a) Projection: Introduction, Principle of Projection, method of projection, planes of projection, four quadrants, first and third angle projection, reference line symbols for methods of projection, Orthographic projection.

b) Projection of Points: Introduction point situated in first, second, third & fourth quadrant. Projection of lines: Introduction, line parallel to one or both the planes, line contained by one or both the planes, line perpendicular to one of the planes, line inclined to one plane and parallel to other. Line inclined to both the planes. [Simple problems only]

UNIT – III: a) Projections of planes: Introduction, types of planes, projection of planes, projection of planes perpendicular to both the reference planes, perpendicular to one plane and parallel to the other plane, perpendicular to one plane and inclined to the other plane.

b) Projections of Solids: Introduction, types of solids, projections of solids in simple position, projections of solids with axes inclined to one of the reference planes and parallel to the other, projections of solids with axes inclined to both H.P. and the V.P., section planes, types of sections, true shape of section, section of solids.

UNIT – IV: a) Development of Surfaces: Introduction, methods of development, development of lateral surfaces of right solids, cube, prisms, cylinders, pyramids & cone.

b) Isometric Projection: Introduction, Isometric axes, lines & planes, Isometric scale, Isometric projection and Isometric view of simple objects.

UNIT – V: Computer Aided Drawing: Introduction to CAD, benefits and limitation of CAD, CAD Software's, AutoCAD introduction, Basic Commands of AutoCAD, Concept of Layers, Dimensioning and text, Creation of two dimensional drawing.

OUTCOMES:

On Completion of the course the student will be able to

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces.
- Prepare isometric and perspective sections of simple solids.
- Demonstrate computer aided drafting.

TEXT BOOKS:

- (i) Bhatt, N.D., "Elementary Engineering Drawing", Charotar Book Stall.
- (ii) George Omura, "Mastering AutoCAD" B.P.B. Publication, New Delhi

REFERENCE BOOKS:

- i. Engineering Graphics – Laxminarayanan V., Vaish Wanan, R.S. Jain Brothers, New Delhi
- ii. Engineering Graphics – Chandra, AM & Chandra Satish 1998.
- iii. Engineering Graphics – K.L. Narayan and P. Kannaih, Tata McGraw Hill
- iv. Text book of Engineering Drawing– N.D. Bhatt, V.M. Panchal, Charotar Publishing House.
- v. The Fundamental of Engineering drawing and Graphics Technology– French and Vireck, McGraw Hill.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech

Branch: All Streams of Engineering

Subject: Engineering Physics

Code: BT 104

Total Theory Periods: 45

Total Tutorial Periods: 00

Total Credits: 03

OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT -1: THEORY OF RELATIVITY

Frame of reference, Galilean principle of relativity, Michelson-Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, time dilation, Relativistic addition of velocities, Variation of mass with velocity, Mass energy equivalence, energy momentum relationship.

UNIT-2: ACOUSTICS AND WAVE OPTICS

(i) Acoustics: Ultrasonic waves: Production and engineering applications, basis requirements for an acoustically good hall, determination of wavelength, reverberation time, Sabine's formula. (ii) Wave Optics: Interference by division of amplitude: Newton's rings experiment, interference by division of wavefront: Fresnel's biprism experiment, Diffraction at single slit, diffraction grating, Resolving Power of grating.

UNIT-3: X-RAY AND CONDUCTIVITY

(i) X-ray: Origin of continuous and characteristic X-ray, Duane-Hunt limit for minimum wavelength, Moseley's law, Bragg's law for X-ray diffraction. (ii) Super Conductivity: Superconductors, Meissner effect, Type-I and Type-II, Super conductors, BCS theory, application of superconductors.

UNIT-4: QUANTUM PHYSICS

Inadequacy of classical mechanics-Qualitative study of black body radiation and photoelectric effect, Compton effect, DeBroglie's hypothesis, Davison – Germer experiment, Uncertainty principle and its applications, Wave function and wave packet, phase and group velocities, Probabilities and normalization, Schrödinger equation: Time dependent and time independent, Application of Schrödinger equation: particle in a box

UNIT -5: LASER

Introduction, temporal and spatial coherence, principle of Laser, stimulated and spontaneous emission, Einstein's Coefficients, He-Ne Laser, Ruby Laser, Application of Lasers.

TEXT BOOKS:

1. Gaur and Gupta "Engineering Physics"
2. Beiser, "Modern Physics", McGraw-Hill Inc., New Delhi.
3. Avadhanulu and Kshirsagar "Engineering Physics".

REFERENCE BOOKS:

1. Jenkins and White: "Optics", McGraw-Hill Book Company.
2. Singh R.B. : "Physics of Oscillations and Waves"

3. Ghatak A.K.: "Optics"
4. Mani and Mehta: "Modern Physics", Affiliated East-West Press Pvt. Ltd, 1998.
5. Sanjeev Puri: Modern Physics, narosa Pub. Co. 2004.
6. Azroff: Solid State Physics, Tata McGraw-Hill, 2004.
7. Theraja: B.L., Basic Electronics, S.Chand, 2002.
8. Puri: Digital Electronics, Tata McGraw-Hill, 2002.
9. Millman, J and Halkias: integrated Electronics, Tata McGraw-Hill, 2004.
10. Tyagrajan and Ghatak: Lasers, Macmillan, 2001.

OUTCOMES:

- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and
- They will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech

Branch: All Streams of Engineering

Lab: Basic Electrical Engineering Lab

Code: BT 105

Total Practical Periods: 30

Total Credits: 01

OBJECTIVES:

To enhance the fundamental knowledge in Electrical Engineering concepts with practical approach.

List of Experiments (To perform minimum 10 experiments)

1. To verify Thevenin's theorem and Norton's theorem.
2. To verify Superposition theorem.
3. To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.
4. To verify Maximum Power Transfer theorem
5. To determine V– I characteristics of Incandescent lamp.
6. To study B-H curve.
7. To measure current, power, voltage and power factor of series RLC circuit.
8. To measure current, power, voltage of parallel RLC circuit.
9. To measure current, power, voltage of series parallel RLC circuit.
10. To measure R and L of choke coil.
11. To study construction of transformer.
12. To perform ratio test and polarity test of single phase transformer.
13. To calculate efficiency of single phase transformer by direct loading.
14. To study construction of D.C. machine.
15. To study charging and discharging of a capacitor.
16. To study the Wattmeter and Energy meter.

OUTCOMES:

- Ability to fabricate carpentry components and pipe connections including plumbing works.
- Ability to use welding equipments to join the structures.
- Ability to fabricate electrical circuits.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech
Lab: Engineering Physics Lab
Total Practical Periods: 30

Branch: All Streams of Engineering
Code: BT 106
Total Credits: 01

OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS (Any ten experiments can be performed)

1. To determine the surface tension by Capillary/Jager's method.
2. To determine the wave length of light by Newton's rings method.
3. To determine the wave length of light by Fresnel's Biprism.
4. To determine the focal length of combination of two thin lenses by nodal slide assembly and its verification.
5. To determine specific resistance of a wire by Carry Foster's Bridge.
6. To determine the Hall coefficient of semiconductor.
7. To determine e/m by Thomson's method.
8. Study of Photo – Cell and determination of Planck's constant.
9. Determination of wavelength of a spectral line using diffraction grating.
10. Determination of divergence of LASER beam.
11. Determination of grating element of a diffraction grating using LASER beam.
12. To determine the coefficients of viscosity of a liquid by capillary flow/Stoke's method.
13. To determine the frequency of A.C. mains using sonometer.
14. To determine the moment of inertia of flywheel.
15. To determine the forbidden energy gap of semiconductor diode.
16. To determine the mechanical equivalent of heat (J) by Calender & Barne's method.
17. To determine the numerical aperture (NA) of the given fiber cables.
18. To study the characteristics of LDR.

OUTCOMES:

- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech
Lab: Engineering Graphics Lab
Total Practical Periods: 30

Branch: All Streams of Engineering
Code: BT 107
Total Credits: 01

OBJECTIVES:

- To introduce the practical approach to Engineering Drawing.
- To give the in depth understanding of drawing concepts alongwith modelling of various geometries in CAD softwares.

LIST OF EXPERIMENTS

Component-1

Sheet-1: Projection of Solids (4 problems) + Section and Development of solid surfaces (4 problems) Sheet-2: Orthographic projection without section (4 problems). Sheet-3: Orthographic projection with section (4 problems). Sheet-4: Isometric Projections (6 problems).

Component -2

One A-3 size sketch book consisting of:-

- 1) 6 problems each from Projection of Curves, Lines, Planes and Solids.
- 2) 6 problems from Section and Development of Solids.
- 3) 4 problems each from Orthographic Projections (with Section), Reading of orthographic projections and Isometric projections.

Component - 3

1. An introduction of CAD software and its utilities in the engineering software.
2. Study of the basic initial setting and viewing of drafting software interface.
3. Study of various tool bar options and exercises to familiarize all the drawing tools.
4. Use of various modify commands of drafting software.
5. Dimensioning in 2d and 3d entities.
6. Draw different types of 3d modelling entities using viewing commands, to view them (isometric projection).
7. Sectioning of solid primitives and rendering in 3d.
8. Intersection of solid primitives.

OUTCOMES:

The hands on exercises undergone by the students will help them to apply Engineering Drawing concepts to evaluate engineering.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech
Lab: Communication & Soft Skills
Total Practical Periods: 30

Branch: All Streams of Engineering
Code: BT 108
Total Credits: 01

OBJECTIVES:

- To improve the reading, writing and speaking skills of students in English language.
- To enhance the resume writing, group discussion, interview skills and technical report writing through practical sessions.

List of Tasks

1. Listening comprehension – Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English, and American English; intelligent listening in situations such as interview in which one is a candidate.
2. Vocabulary building, Creativity, using Advertisements, Case Studies etc.
3. Personality Development: Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking
4. Cross-Cultural Communication: Role-Play/ Non-Verbal Communication.
5. Meetings- making meeting effective, chairing a meeting, decision making, seeking opinions, interrupting and handling interruptions, clarifications, closure- Agenda, Minute writing.
6. Group Discussion – dynamics of group discussion, Lateral thinking, Brainstorming and Negotiation skills
7. Resume writing – CV – structural differences, structure and presentation, planning, defining the career objective
8. Interview Skills – formal & informal interviews, concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing
9. Writing Skills - Business Communication, Essays for competitive examinations.
10. Technical Report Writing/ Project Proposals – Types of formats and styles, subject matter –organization, clarity, coherence and style, planning, data-collection, tools, analysis.- Feasibility, Progress and Project Reports.

OUTCOMES:

The practical sessions undergone by the students will help them to face job interviews and overall personality development and improvement in communication skills.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: 1st B.Tech

Branch: All Streams of Engineering

Lab: Workshop Practice -I

Code: BT 109

Total Practical Periods: 45 (15 Instructional Periods) Total Credits: 02

OBJECTIVES:

- To improve the basic understanding of carpentry, foundry and welding shop and make students familiar with various equipments and processes used in these shops.

INSTRUCTIONAL SYLLABUS

Carpentry:

Timber, definition, engineering applications, seasoning and preservation, plywood and ply boards.

Foundry:

Moulding sands, constituents and characteristics. Pattern, definition, materials, types, core prints. Role of gate, runner, riser, core and chaplets. Causes and remedies of some common casting defects like blow holes, cavities, inclusions.

Welding:

Definitions of welding, brazing and soldering processes, and their applications, Oxyacetylene gas welding process, equipment and techniques, type of flames and their applications. Manual metal arc

Welding technique and equipment, AC and DC welding, electrodes, constituents and functions of electrode coating. Welding positions. Type of weld joint. Common welding defects such as cracks, undercutting slag inclusion, porosity.

LIST OF EXPERIMENTS

1. T-Lap joint and Bridle joint (Carpentry shop)
2. Mould of any pattern (foundry shop)
3. Casting of any simple pattern (foundry shop)
4. (a) Gas welding practice by students on mild steel flat, (b) Lap joint by Gas welding
5. (a) MMA Welding practice by students, (b) Square butt joint by MMA Welding
6. (a) Lap joint by MMA Welding, (b) Demonstration of brazing

OUTCOMES:

The hands on practical sessions undergone by the students will help them to understand various equipments and processes in carpentry, foundry and welding shop and apply the knowledge acquired in engineering field.