



MATS UNIVERSITY

Raipur (C.G.)

Syllabus Scheme

(1st Semester)

For

Diploma in Engineering

(MECHANICAL & CIVIL ENGINEERING)



School of Engineering & I.T.
ARANG, RAIPUR (C.G.)



MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



Scheme of Teaching & Examination

Diploma in Engineering (MECHANICAL AND CIVIL ENGINEERING)

I - Semester

S.N.	code	Subject	Periods per week			Scheme of marks		Total Credit
			L	T	P	ESE	IM	
1.	DP100	Applied Mathematics-I	4	-	-	70	30	4
2.	DP101	Applied Physics	3	-	-	70	30	3
3.	DP102	Applied Mechanics	3	2	-	70	30	4
4.	DP103	Communication Skills	3	-	-	70	30	3
5.	DP104	Environment and Ecology	3	-	-	70	30	3
6.	DP105	Applied Physics Lab	-	-	2	30	20	1
7.	DP106	Applied Mechanics Lab	-	-	2	30	20	1
8.	DP107	Communication Lab	-	-	2	30	20	1
9.	DP108	Non Conventional Energy Sources Lab	1	-	2	30	20	2
10.	DP109	Workshop Practice – I	1	-	2	30	20	2
Total			18	2	10	500	250	24

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

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

Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Mathematics-I
Total Theory Periods	:	60
Total Tutorial Periods	:	00
Total Credits	:	04
Code	:	DP 100

UNIT-I Algebra :

Logarithms- Definition of logarithm (Natural and Common logarithm.), Laws of logarithm. Examples.

Partial Fraction- Definition of polynomial fraction proper & improper. Fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors. To resolve improper fraction into partial fraction.

UNIT-II : Determinant And Matrices :

Determinant- Definition and expansion of determinants of order 2 and 3. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns.

Matrices- Definition of a matrix of order $m \times n$ and types of matrices. Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication. Transpose of a matrix. Minor, cofactor of an element of a matrix, adjoint of matrix and inverse of matrix by adjoint method. Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.

UNIT-III : Binomial Theorem :

Definition of factorial notation, definition of permutation and combinations with formula. Binomial theorem for positive index. General term. Binomial theorem for negative index. Approximate value (only formula)

UNIT-IV : Trigonometry : Trigonometric Ratios –

Trigonometric ratios of any angle, Relation between degree and radian, Fundamental identities, Examples based on Fundamental Identities, factorization and defactorization formulae, inverse trigonometric ratios Definition of inverse trigonometric, ratios, Principal. Relation between inverse trigonometric ratios. values of inverse trigonometric ratios.

UNIT-V: Coordinate Geometry : Point And Distances-

Distance formula, Section formula, midpoint, centroid of triangle. Area of triangle and condition of collinearity.

Straight Line- Slope and intercept of straight line. Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. Angle between two straight lines condition of parallel and perpendicular lines. Intersection of two lines.

Circle- Equation of circle in standard form, centre – radius form, diameter form, two – intercept form. General equation of circle, its centre and radius.

Vectors- Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) Dot (Scalar) product with properties. Vector (Cross) product with properties. applications of vectors work done and moment of force about a point & line.

Reference Books –

- 1 Mathematics for polytechnic, S. P. Deshpande Pune Vidyarthi Griha
- 2 Mathematics for Polytechnic Volume I, TTTI Publication
- 3 Applied Mathematics, EEB Publication, Bhopal
- 4 Trigonometry S. L. Loney S., Chand Publication
- 5 College Algebra Frc.G. Valles Charotar Publication
- 6 Matrices Ayres Schuam series, McGraw hill

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SCHOOL OF ENGINEERING & I.T.

Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Physics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 101

UNIT-I : Units and Measurements :

Fundamental units, Derived units, unit system, S.I. units – Their impotence & notation, Base, S.I. units system & Abbreviations, Principle of vernier calipers, screw gauge & Speedometer. Definition of accuracy, precision and error, estimation of errors -absolute error, relative error and percentage error, rules and identification of significant figures. (Numerical on percentage error and significant figures)

UNIT-II : Force, Motion & Gravitation :

Equations of motion, Newton's law of motion, Force & its derivation from Newton's laws of motion, Composition and resolution of forces, Parabolic Motion, Horizontal projection and projection at an angle, time of flight, Horizontal range and maximum horizontal range, Simple Problems, Centripetal acceleration, centripetal and centrifugal forces, Concept of friction and its application. Application to banking of roads, Newton's law of Gravitation, Basic forces in nature, Gravitational field, Potential, Relation between "g" & "G", factors influencing "g" escape velocity, kepler's Laws of planetary motion, satellites, Time period of satellites, simple pendulum.

UNIT-III : Elasticity, Surface Tension & Viscosity :

Concept of elasticity, Deformation, Stress, Strain- its kinds and units, Hooke's law, elastic unit, elastic fatigue, Moduli of elasticity's, Young's Modulus and its determination by Snarl's method. Molecular forces, cohesive and adhesive forces, surface tension & surface energy, Reason for spherical shape of Rain Drops, Angle of contact, pressure difference a liquid surface excess pressure inside a liquid drop & soap bubble, shape of liquid surface In a capillary tube, Rise of liquids in a capillary tube, Determination of surface tension by capillary rise method. „Effect of temperature on surface tension, examples of surface tension. Concept of viscosity & coefficient of viscosity, streamline and Turbulent flow.

UNIT-IV : Light, Laser And Sound :

Applications of Light- Refraction and refractive index. Defects in image formation (Qualitative), Simple and compound microscope, astronomical and Galileo telescopes and their magnifying powers.

LASER - Properties of laser, spontaneous and stimulated emission, population inversion, optical Pumping, construction and working of He-Ne laser.

Applications of Sound –Ultrasonic Production of ultrasonic waves by using magnetostriction and piezo – electric methods. Applications to drilling cold welding, cleaning, flaw detection and exploration.

Acoustics-Reflection, refraction and absorption of sound waves by surfaces. Echo and reverberation.

UNIT-V :Modern Physics :

Photo electricity- Concept of photon, Plank's hypothesis, properties of photon, photo electric effect, Characteristics of photoelectric effect, work function, Einstein's photoelectric equation(no derivation), photoelectric cell-construction, working and applications

X-rays - Introduction to x-rays, types of x-ray spectra-continuous and characteristics, production of x-rays using Coolidge tube, minimum wavelength of x-rays, properties of x-rays, engineering, medical and scientific applications.

Reference Books -

1. Applied Physics Vol. I&II H.C. Saxena & Prabhakar Singh
2. Applied Physics Vol. I&II D.Halliday & R.Rasnick
3. Engineering Physics – BVN Rao
4. Principles of Physics – K.K. Mohindroo
5. Basic Principles of Physics – Brij Lal Subramanyam.
6. Physics-I V. Rajendran, Tata McGraw- Hill raw- Hill publication, New Delhi
7. Applied physics Arthur Beiser, Tata McGraw- Hill raw- Hill Publication, New Delhi
8. Engineering Physics by R.K.Gaur and S.L.Gupta, Dhanpat Rai Publication, New Delhi.

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

Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Mechanics
Total Theory Periods	:	48
Total Tutorial Periods	:	16
Total Credits	:	04
Code	:	DP 102

UNIT-I Fundamental Concepts :

Definition of Mechanics, Statics, Dynamics, Kinetics, Kinematics. Concept of space, mass, particle, body, rigid body. Scalar, vector, fundamental units, derived units.

UNIT-II : Forces And Friction :

Force- concept, definition, unit, graphical representation. Concept of system of forces- non-coplanar, coplanar, concurrent, non-concurrent & parallel forces. Composition & Resolution of forces. Free body diagrams, law of parallelogram, Varignon's theorems.

Friction- Rough & Smooth surfaces, concept of friction. Types of friction, Coloumb's law of friction, Co-efficient of friction, angle of friction, angle of repose. Ladder and wedge friction. Friction in Journal bearings Method of reducing friction.

UNIT-III : Centroid and Centre of Gravity :

Centroid- Definition of centroid, moment of an area about an axis, centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite geometrical figures.

Centre of gravity- Definition, centre of gravity of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids.(No hollow solids shall be considered)

UNIT-IV : Simple Lifting Machines :

Load, Effort, Mechanical advantage, Velocity ratio, Efficiency and relation between them. Law of Machine, Reversibility of Lifting machine. Study of Machines- Differential wheel & axel, Weston differential pulley block, Simple Screw Jack, Worm & Wheel, Single and Double purchase Winch, System of pulleys.

Transmission Of Power- Transmission of power through Belt, Rope and Gears, Ratio of tension on tight and slack sides. Spur, Helical & Bevel gear, Rack and Pinion gear. Gear Trains- Simple, Compound, Reverted.

UNIT-V : Kinetics and Kinematics :

Kinetics of particle, motion under constant force, Newton's Laws of Motion. D' Alemberts principle. Motion under constant torque, Flywheel. Kinematics in Cartesian and polar coordinates. Angular displacement, Angular Velocity, Angular Acceleration. Motion under gravity.

References-

1. A Text Book of Applied Mechanics R.S. Khurmi, S. Chand & Company Ltd., New Delhi
2. Applied Mechanics I. B. Prasad, Khanna Publisher, New Delhi
3. Beer – Johnson Engineering Mechanics Tata McGraw Hill, Delhi
4. Basu Engineering Mechanics Tata McGraw Hill, Delhi
5. R. S. Khurmi Applied Mechanics Dhanpat Rai & sons, Delhi
6. Dhade, Jamdar & Walawalkar Fundamental of Applied Mechanics Pune Vidhyarthi Gruh Prakashion, Pune
7. Engineering Mechanics Timoshenko & Young, Mc Garawhills Publication Punamia, Standard Publisher Distributor New Delhi

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SCHOOL OF ENGINEERING & I.T.

Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Communication Skill
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 103

UNIT-I Passage for Comprehension:

(1)Language of Science (2) Robotic Revolution (3) Designing a Car (4)New Wonders of camera (5)Non-conventional sources of Energy (6)Our Environment (7)Entrepreneurship (8)Safety practices(9) Taming the Atom Radar and its Uses (10) A Volcano (11)Precision – A Measure of Progress (12) Laser

UNIT-II Applied Grammar:

(1)Determiners (2)Auxiliaries (3)Tenses (4)Conditional (5)Passive (6)Prepositions (7)Subject-verb Agreement (8)Clauses & Connectors (9) Basic Sentence (10) Pattern(11) Infinitives(12) Narration (13)Common Errors(14) Modifiers (15) Paragraph Writing

UNIT-III Letter Writing:

Theory: Introduction Purposes of Letters, Characteristics of a Letter, Mechanics and Style, Types of Business Letters: - Letter of Enquiry, Answer to an Enquiry .

Writing Skills: (1) Application (For Job/Leave) (2) Letter of Enquiry and replies (3) Letter for Order Placement (4) Letter of Complaints (To Editor/ Appropriate Authorities)

UNIT-IV Report Writing:

Writing Progress – Report of a job, General outline for preparing a Project Report.

UNIT-V Technical Writing:

Technical Writing: - A Communication Skill , Basic facts of Technical Writing ,.

Features of Technical Writing: - Features of Technical Writing, Style: Literary and Technical, Mechanics of Technical Writing.

Forms of Technical Writing: - Forms, Writing Definitions, Writing Technical Descriptions, Writing Technical Descriptions of Processes, Writing Instructions .

Writing Technical Reports a. Qualities of a Good Report b. Forms of Reports c. Types of Report

References:

1. Communication Skill for Teaching Students Book-I. M/s Somaiya Publications. Pvt. Ltd., Bhopal.
2. Living English Structure –W.S. Allen
3. Practical English Grammar (Exercises I by Thomson & Martinet)
4. English conversation practice by Grant Taylor.
5. Grammar & Composition by P R Sarkar, Anand Marg Publication, Easter, Matropolition Calcutta.
6. Essentials of English & Business Communication.by Rajendra Pal,J.S Korlahalli S.Chand & Sons, New Delhi.

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Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Environment and Ecology
Total Theory Periods	:	60
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 104

UNIT-I : Introduction And Global Warming :

Definition, Scope & Importance, Need For Public Awareness- Environment definition, Eco system – Balanced ecosystem, Human activities – Food, Shelter, Economic and social Security. The Environment, the impact of human being upon the environment, the impact the Environment upon human beings, Improvement of Environment quality, the role of the Environmental engineer. Global warming – reasons.

UNIT-II : Environmental Pollution :

Environmental Pollution and their effects. Water pollution, Land pollution. Noise pollution, Public Health aspects, Air Pollution, Solid waste management. Current Environmental Issues of Importance: Population Growth, Climate Change and Automobile pollution. Acid Rain,

UNIT-III : Environmental Pollution Control :

Atmospheric cleansing processes, Approaches to contaminant control. Central devices for particulate contaminants Gravitational settling chambers, centrifugal collectors, wet collectors, Fabric filters (Baghouse filters) Electrostatic precipitators (ESP) control devices for gaseous contaminants-absorption, condensation, combustion, Automotive emission control. Noise measurement, the problem of noise pollution and legal measures for its control.

UNIT-IV : Industrial Wastes :

Industrial Waste treatment – Economics of waste treatment benefits of pollution abatement (primary, secondary and intangible benefits), difficulties in achieving, pollution abatement through industrial waste treatment, theories of waste treatment of specific – industrial waste such as textile, dairy paper and pulp, and distillery waste.

UNIT-V : Environmental Protection :

Environmental Protection- Role of Government, Legal aspects, Initiatives by Non-governmental Organizations (NGO), Environmental Education, Women Education.

References:

1. Air pollution by Perkins.
2. Liquid waste of industry, theories, practices and treatment by Nelson L. Vamerow.
3. Management of solid waste in developing countries by Flint off.
4. Environmental Engineering (International edition) by Peavy, Howards. (Mc Graw H Series in Environmental engineering)
5. Air Pollution – It's origin and control by keneth work and Warmer. (W.H.O. Publication)
6. industrial waste by Namit.
7. Environment protection-Problems, Policies administration, Law edited by Paras Diwan Deep & Deep Publications.

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Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Physics Lab
Total Practical Periods	:	24
Total Credits	:	01
Code	:	DP 105

LIST OF EXPERIMENTS

1. To use Vernier Caliper for the measurement of dimensions of given object.
2. To use Micrometer Screw Gauge for the measurement of dimensions (Length, Thickness, Diameter) of given object.
3. To verify Hooke's Law by Searle's method and to calculate Young's modulus of elasticity of steel wire.
4. To determine the value of "g" using simple pendulum.
5. To determine Young's modulus of elasticity of the material of given wire using Searl's apparatus.
6. To determine surface tension of water by capillary rise method.
7. To determine coefficient of viscosity of given fluid (Glycerin) using Stoke's Method.
8. To determine coefficient of viscosity of a fluid by Poiseuille's method.
9. To determine refractive index of the material of prism using graph.
10. To determine focal length of concave mirror & convex lens.
11. To determine focal length of combination of two lenses.
12. To determine mechanical equivalent of heat by using Joules calorimeter.
13. To determine the velocity of sound by using resonance tube.
14. To verify characteristics of photoelectric cell.
15. Use of Thermocouple as a thermometer for the measurement of unknown temperature (Boiling Point of Water)

List of Apparatus

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Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Mechanics Lab
Total Practical Periods	:	24
Total Credits	:	01
Code	:	DP 106

LIST OF PRACTICALS

1. Verification of law of triangle of forces.
2. Verification of law of Parallelogram of forces.
3. Verification of law of Polygon of forces
4. To verification of Lami's theorem.
5. Demonstration of Non-concurrent, Non-Parallel forces (Funicular diagram)
6. Verification of Law of Moments.
7. Determination of coefficient of friction for surfaces of different materials on-
a) Horizontal Plane b) Inclined Plane
8. Draw – V-T diagram's for different combinations of-
a) Velocities b) Uniform accelerations
9. Find-out Mechanical advantage, Velocity Ratio and Efficiency for following
Machines- a) Simple Screw b) Differential Wheel & Axle c) Simple Purchase Crab d) Differential Pulley
Block.
10. Demonstration of use of inclined plane as a lifting machine.
11. Experimental location of center of gravity of plane plate of uniform thickness.
12. Comparison of coefficient of friction of various pair of surfaces and determination of angle of repose.
13. To verify equilibrium of parallel forces – simply supported beam reactions.
14. To find MA, VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish Law of
machine and calculate maximum efficiency. Also check the reversibility of a machine
 - 1) Worm and worm wheel or Differential axle and wheel
 - 2) Weston's differential pulley block or Geared pulley block
 - 3) Single purchase crab or Double purchase crab 4) Simple screw jack.
 - 5) Two sheave and three sheave pulley block.
15. Graphical solutions on graph paper of the following:
 - 1) Concurrent force system : Two problems
 - 2) Parallel force system : Two problems
 - 3) Reactions of a beam having vertical point loads & UDL: Two problems

List of Apparatus

MATS UNIVERSITY, RAIPUR (C.G.)
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Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Communication Lab
Total Practical Periods	:	24
Total Credits	:	01
Code	:	DP 107

List of Experiments

1. Listening Skills :

Teacher reads an unseen passage or plays an audio file once. Students have to answer the questions after listening to the passage.

2. Making presentations:

The list of the topics should be displayed during practical session. Students select a topic each through lottery. Presentation should be for five minutes. All the presentations of the students have to be completed before the end examination.

3. Record :

Students have to answer the questions given in the activities in the students' lab manual in a separate notebook or a record book. In the same notebook or record book, they shall answer the questions given in the assignments.

4. Group Discussion:

Before commencing the Discussion the groups and their topics should be displayed . The students shall be divided on the basis of roll number or as per the convenience of the teacher. Each group may consist of five or six students. The Group Discussion may be conducted simultaneously for two or three groups.

4. Speaking Skills :

Teacher asks the students questions individually. Topics for this activity are:

- Introducing Oneself
- Describing Objects
- Reporting Past Incidents
- Describing Events
- Speaking from Observation / Reading
- Interview Skills

List of apparatus

**MATS UNIVERSITY, RAIPUR (C.G.)
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Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Non Conventional Energy Sources Lab
Total Practical Periods	:	24
Total Lecture Periods	:	12
Total Credits	:	02
Code	:	DP 108

List of Experiments (any 5)

1. Study of Solar Radiation by using Pyranometer.
2. Study of Solar Distillation or Solar Still.
3. Study of solar water pumping
4. To study the constructional details of a box type solar cooker.
5. Prepare delicious food by using solar cooker.
6. Study of Thermosiphon solar water heating system.
7. Study of Forced circulation solar water heating system
8. Study of Solar Street Lighting and Lanterns.
9. Study of Bio gas plant.
10. Study of Horizontal Wind Mill
11. Study of Fuel cells.

List of apparatus

MATS UNIVERSITY, RAIPUR (C.G.)
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Semester	:	1 st Diploma in Engineering
Branch	:	All Streams of Diploma in Engineering
Subject	:	Workshop Practice – I
Total Practical Periods	:	24
Total Lecture Periods	:	12
Total Credits	:	02
Code	:	DP 109

- 1. Carpentry Shop**
- 2. Fitting Shop**
- 3. Welding Shop**

LIST OF PRACTICALS

1. Measurement Identification and use of the various measuring tools & instruments.
2. **Wood working (carpentry shop)**
 - 2.1 Identification of carpentry tools and their uses.
 - 2.2 Perform various wood working operations.
3. **Fitting Shop.**
 - 3.1 Identification of various tools used and the operations performed in fitting shop.
 - 3.2 Perform various fitting operations.
 - 3.3 Marking of job as per dimension.
 - 3.4 Sawing.
 - 3.5 Chipping.
 - 3.6 Filing.
 - 3.7 Taping.
 - 3.8 Reaming.
 - 3.9 Drilling.
4. **Welding Shop**
 - 4.1 Identification and use of the various tools and equipments.
 - 4.2 Perform the arc welding and gas welding operations.
 - 4.3 Perform the soldering and Brazing operations.

LIST OF BOOKS

1. Workshop Technology (Vol-1) Hazra & choudhary.
2. Workshop Technology – (Vol-1 & 2) Chapnan
3. Manufacturing process (Vol-1 Delela
4. Materials and Manufacturing Lindberg processes.