**Scheme of teaching and examination for 4-Year Part Time Diploma**
**II Semester Diploma in Civil Engineering**

**THEORY**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) 06 week | Hours of Exam. | Terminal Exam. (A) Marks | Final Exam(B) Marks | Total Marks (A+B) | Pass marks in final exam | Pass marks in the subjects |
| 01 | Engineering Physics | P01102 | 04 | 50 | 03 | 20 | 80 | 100 | 26 | 36 |
| 02 | Basic engineering Drawing | P01203 | 12 | 120 | 04 | 20 | 80 | 100 | 26 | 36 |
| 03 | Elementary Mechanical Engg. & Engg. Materials | P01104 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| 04 | Electrical & Electronics Engg. | P01204 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| **Total period per week :-** | | | **28** | | **Total :-** | | | **400** | | |

**PRACTICAL**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) | Hours of Exam. | Marks Internal Exam. (A) | Marks External Exam. (B) | Total Marks (A+B) | Pass marks final exam | Pass marks in the subjects |
| 05 | Engineering Physics Lab. | P01106 | 04 | 50 | 03 | 10 | 40 | 50 | 16 | 21 |
| **Total period per week :-** | | | **04** | | **Total :-** | | | **50** | | |

**SESSIONAL**

| Sl. No | Subjects | Subject Code | Teaching Scheme | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session year 06 week | Marks of Internal Examiner (X) | Marks of External Examiner (Y) | Total Marks (X+Y) | Pass marks in the subjects | |
| 06 | Basic Engg. Drawing | P01208 | - | - | 20 | 30 | 50 | 25 | |
| | **Total period per week :-** | | | **Total :-** | | | **50** | | |
| **Over all total period per week:-** | | | **32** | **Total Marks:-** | | | **500** | | |

**Scheme of teaching and examination for 4-Year Part Time Diploma**
**II Semester Diploma in Electrical Engineering**

**THEORY**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) | Hours of Exam. | Terminal Exam. (A) Marks | Final Exam(B) Marks | Total Marks (A+B) | Pass marks in final exam | Pass marks in the subjects |
| 01 | Engineering Physics | P01102 | 04 | 50 | 03 | 20 | 80 | 100 | 26 | 36 |
| 02 | Basic engineering Drawing | P01203 | 12 | 120 | 04 | 20 | 80 | 100 | 26 | 36 |
| 03 | Elementary Mechanical Engg. & Engg. Materials | P01104 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| 04 | Electrical & Electronics Engg. | P01204 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| **Total period per week :-** | | | **28** | | | | **Total :-** | **400** | | |

**PRACTICAL**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) | Hours of Exam. | Marks Internal Exam. (A) | Marks External Exam. (B) | Total Marks (A+B) | Pass marks final exam | Pass marks in the subjects |
| 05 | Engineering Physics Lab. | P01106 | 04 | 50 | 03 | 10 | 40 | 50 | 16 | 21 |
| **Total period per week :-** | | | **04** | | | | **Total :-** | **50** | | |

**SESSIONAL**

| Sl. No | Subjects | Subject Code | Teaching Scheme | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session year 06 week | Marks of Internal Examiner (X) | Marks of External Examiner (Y) | Total Marks (X+Y) | Pass marks in the subjects | |
| 06 | Basic Engg. Drawing | P01208 | - | - | 20 | 30 | 50 | 25 | |
| | **Total period per week :-** | | | | | **Total :-** | **50** | | |
| **Over all total period per week:-** | | | **32** | | | **Total Marks:-** | **500** | | |

**Scheme of teaching and examination for 4-Year Part Time Diploma**
**II Semester Diploma in Electronics Engineering**

**THEORY**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) | Hours of Exam. | Terminal Exam. (A) Marks | Final Exam(B) Marks | Total Marks (A+B) | Pass marks in final exam | Pass marks in the subjects |
| 01 | Engineering Physics | P01102 | 04 | 50 | 03 | 20 | 80 | 100 | 26 | 36 |
| 02 | Basic engineering Drawing | P01203 | 12 | 120 | 04 | 20 | 80 | 100 | 26 | 36 |
| 03 | Elementary Mechanical Engg. & Engg. Materials | P01104 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| 04 | Electrical & Electronics Engg. | P01204 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| **Total period per week :-** | | | **28** | | | | **Total :-** | **400** | | |

**PRACTICAL**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) | Hours of Exam. | Marks Internal Exam. (A) | Marks External Exam. (B) | Total Marks (A+B) | Pass marks final exam | Pass marks in the subjects |
| 05 | Engineering Physics Lab. | P01106 | 04 | 50 | 03 | 10 | 40 | 50 | 16 | 21 |
| **Total period per week :-** | | | **04** | | | | **Total :-** | **50** | | |

**SESSIONAL**

| Sl. No | Subjects | Subject Code | Teaching Scheme | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session year 06 week | Marks of Internal Examiner (X) | Marks of External Examiner (Y) | Total Marks (X+Y) | Pass marks in the subjects | |
| 06 | Basic Engg. Drawing | P01208 | - | - | 20 | 30 | 50 | 25 | |
| | **Total period per week :-** | | | | | **Total :-** | **50** | | |
| **Over all total period per week:-** | | | **32** | | | **Total Marks:-** | **500** | | |

**Scheme of teaching and examination for 4-Year Part Time Diploma**
**II Semester Diploma in Mechanical Engineering**

**THEORY**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) | Hours of Exam. | Terminal Exam. (A) Marks | Final Exam(B) Marks | Total Marks (A+B) | Pass marks in final exam | Pass marks in the subjects |
| 01 | Engineering Physics | P01102 | 04 | 50 | 03 | 20 | 80 | 100 | 26 | 36 |
| 02 | Basic engineering Drawing | P01203 | 12 | 120 | 04 | 20 | 80 | 100 | 26 | 36 |
| 03 | Elementary Mechanical Engg. & Engg. Materials | P01104 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| 04 | Electrical & Electronics Engg. | P01204 | 06 | 60 | 03 | 20 | 80 | 100 | 26 | 36 |
| **Total period per week :-** | | | **28** | | | | **Total :-** | **400** | | |

**PRACTICAL**

| Sl. No | Subjects | Subject code | Teaching Scheme | | Examination Scheme | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session (Year) | Hours of Exam. | Marks Internal Exam. (A) | Marks External Exam. (B) | Total Marks (A+B) | Pass marks final exam | Pass marks in the subjects |
| 05 | Engineering Physics Lab. | P01106 | 04 | 50 | 03 | 10 | 40 | 50 | 16 | 21 |
| **Total period per week :-** | | | **04** | | | | **Total :-** | **50** | | |

**SESSIONAL**

| Sl. No | Subjects | Subject Code | Teaching Scheme | | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Periods per week | Period in one session year 06 week | Marks of Internal Examiner (X) | Marks of External Examiner (Y) | Total Marks (X+Y) | Pass marks in the subjects | |
| 06 | Basic Engg. Drawing | P01208 | - | - | 20 | 30 | 50 | 25 | |
| | **Total period per week :-** | | | | | **Total :-** | **50** | | |
| **Over all total period per week:-** | | | **32** | | | **Total Marks:-** | **500** | | |

# ENGINEERING PHYSICS

| Subject Code | Theory | | | No of Period in one session : 50 | | |
|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 |
| | L | T | P/S | Annual Exam. | : | 80 |
| P01102 | 04 | — | — | Internal Exam. | : | 20 |

**Rationale and Objective:**

Knowledge of Physics is so interwoven with engineering studies that one can not think of pursuing engineering studies without the knowledge of Physics. Study of Physics is essential for Diploma holders in engineering and technology to develop in them proper understanding of physical phenomenon, scientific temper and engineering aptitude.

The course covers the basic laws and principles of Physics and its applications. The course contents are so chosen that it should be more relevant to the modern development of science to meet the challenge posed by fast-changing technology.

Keeping these objectives in view the subject has been divided into the following topics:

| S.No. | Topics | Periods |
|---|---|---|
| 1. | General Physics | (22) |
| 2. | Heat | (01) |
| 3. | Electrostatics | (03) |
| 4. | Current Electricity & Magnetism | (12) |
| 5. | Modern Physics | (10) |
| 6. | Environment & Safety | (02) |
| | | **(50)** |

Teachers are advised to use the latest technology of teaching (e.g. use of LRs etc.) and make maximum use of demonstration so that the subject will be interesting to the students. The Engineering applications of the principles of physics should be discussed broadly. Use of S.I. units for all measurements and calculations is recommended.

**CONTENTS:**

**TOPIC: 01 - GENERAL PHYSICS: [22]**

**01.01 Units and Dimensions [02]**

01.01.01 Units of Fundamental and Derived Physical quantities.
01.01.02 System of Units - C.G.S., M.K.S., F.P.S. & S.I. System and their full forms (Foot Pound Second)
01.01.03 Basic & Supplementary Units - Names & Symbols
01.01.04 Advantages of S.I. System - Comprehensive, Coherent & Rational
01.01.05 Dimensions & Dimensional formula of simple Physical quantities, Dimensionless quantities.
01.01.06 Dimensional equations and their uses - Conversion of Units from one system to another, to check correctness of equation, establish relation between different physical quantities.
01.01.07 Limitations of Dimensional analysis.

**01.02 Scales & Mesurements [02]**

01.02.01 Vernier Scale & least count.
01.02.02 Vernier (Slide) Callipers.
01.02.03 Screw - Pitch & Least Count.
01.02.04 Screw Gauge (Micrometer Gauge) & Spherometer - their construction and operation.
01.02.05 Spherometer - Measurement of thickness of a sheet or plate.

**01.03 Scalars & Vectors [02]**

01.03.01 Scalar & Vector quantities, Representation of a Vector.
01.03.02 Addition & Subtraction of two vectors - triangle method.
01.03.03 Resolution of vector into two mutually perpendicular components.

**01.04 Linear Motion** **[01]**

01.04.01 Speed & velocity - Definition, Difference (Distinction), their Units & Dimensions.

01.04.02 Uniform Velocity, Uniformly accelerated Velocity (Uniform acceleration) & Retardation.

01.04.03 Derivation of formulas:

(i) $v = u + at$

(ii) $s = ut + \frac{1}{2} at^2$

using differentiation & integration method.

**01.05 Motion Under Gravity** **[01]**

01.05.01 Acceleration due to gravity - Unit & Dimension.
Weight and mass.

01.05.02 Co-ordinate Convention of displacement, Velocity and acceleration.

01.05.03 Equations of motion of body moving freely under gravity:

(i) Downwards

(ii) Upwards

**01.06 Projectile** **[02]**

01.06.01 Projectile - Definition & examples.

01.06.02 Oblique projection - Derivation of equation for trajectory, Range, Maximum height, Time of flight & time for attaining maximum height.

01.06.03 Angle of projection for maximum range for fixed speed of projection.

01.06.04 Horizontal & vertical projectiles and their path.

01.06.05 Simple numericals based on formulas.

**01.07 Friction** **[02]**

01.07.01 Friction - Definition, Types of friction - Sliding & Rolling, Static & Dynamic (Kinetic).

01.07.02 Limiting frictional force. Laws of Static & Kinetic friction. Experimental Verification not required.

01.07.03 Co-efficient of friction - a unitless quantity.

01.07.04 Equilibrium of a body on rough inclined plane under the effect of its weight & frictional force.

01.07.05 Angle of Repose & its uses.

01.07.06 Friction - necessary evil.

01.07.07 Use of lubricants to reduce friction - solid, liquid & gas.

01.07.08 Simple numericals based on formulas.

**01.08 Circular Motion** **[02]**

01.08.01 Circular Motion - Definition.

01.08.02 Angular Displacement, Velocity and acceleration & their units.

01.08.03 Relation between linear and angular velocity and acceleration - Differential Calculus method.

01.08.04 Centripetal Force and its derivation by Vector method.

01.08.05 Centrifugal force, its presence felt only in rotational systems - Pseudo force.

01.08.06 Applications of Circular motion:

- motion of cyclist on curved path
- banking of tracks

principle of working of cream separator, cloth drier, centrifuge machine

01.08.07 Simple numericals based on formulas.

**01.09 Simple Harmonic Motion** **[02]**

01.09.01 Periodic motion & S.H.M. - Definitions.

01.09.02 Expressions for displacement, velocity, acceleration and time period of S.H.M. Derivation not required.

01.09.03 Phase & Epoch - Definition.

01.09.04 Equation of S.H.M. starting from equilibrium position and another point.

$y = a \sin wt$ & $y = a \sin (wt+\phi)$.

01.09.05 Elastic spring & spring constant.

01.09.06 Motion of a block tied to a massless spring moving on a horizontal frictionless table.

01.09.07 Time period of a Simple pendulum - derivation.

01.09.08 Simple numericals based on formulas.

**01.10** **Gravitation** **[02]**

01.10.01 Newton's law & formula for force between two bodies.
01.10.02 Units & Dimensions of 'G' and 'g'.
01.10.03 Relation between 'G' and 'g' and their values.
01.10.04 Value of 'g' at earth's surface, above and below earth's surface - maximum value.
No Derivation required.
01.10.05 Satellite - Orbital Velocity and time period.
01.10.06 Parking Orbit - Definition
01.10.07 Escape Velocity - Definition & expression in terms of 'g'.
Derivation not required.
01.10.08 Simple numericals based on formulas.

**01.11** **Rotational Motion and Moment of Inertia** **[03]**

01.11.01 Moment of Inertia & Radius of Gyration - Definition, units and dimension.
01.11.02 M.I. of Uniform ring & Uniform Disc about their natural axes.
01.11.03 M.I. of Solid Sphere about its diameter - derivation of expression.
01.11.04 Rolling on inclined smooth plane without slipping - Expression for acceleration along the plane to be derived.
01.11.05 Sliding motion of a body down a rough inclined plane under its own weight only - No external force - derivation of expression.
01.11.06 Torque and angular momentum - definition & expression.
01.11.07 Principle of Conservation of angular momentum and its examples.
No derivation required.
01.11.08 Simple numericals based on formula.

**01.12** **Fluids** **[01]**

01.12.01 Surface Tension & Surface Energy - Introduction, Unit & Dimension.
01.12.02 Capillary rise - expression and its applications.
No Derivation required.
01.12.03 Laminar Flow & Co-efficient of Viscosity - Unit & Dimension.
01.12.04 Streamline & Turbulent flow - Definition.
01.12.05 Motion of Spinning ball in air (a viscous medium) and free fall of rain drops - Qualitative Discussion.

**TOPIC: 02 - HEAT:** **[01]**

02.01 Heat **[01]**
02.01.01 Heat form of energy. Unit of heat - Joule & Calorie.
02.01.02 Modes of heat transfer and their examples.

**TOPIC: 03 - ELECTROSTATICS:** **[03]**

03.01 Field & Potential **[01]**
03.01.01 Electric Field, Intensity and Potential due to a point charge.
03.01.02 Units & Dimensions of electric intensity & potential.
03.01.03 Derivation of potential at a point due to point charge.

03.02 Capacity & Condenser **[02]**
03.02.01 Capacity of a Single Conductor and Condenser (Capacitor).
03.02.02 Capacity of a Parallel Plate Condenser - Expression only.
No derivation required.
03.02.03 Series & Parallel grouping of Condensers and expressions for equivalent capacities.
No derivation required.

**TOPIC: 04 - CURRENT ELECTRICITY AND MAGNETISM: [12]**

**04.01 E.M.F. & P.D. [01]**

04.01.01 Definition - Units

04.01.02 Internal resistance of cell.
Expression for current I = E/(R+r).

**04.02 Kirchoff's Laws [02]**

04.02.01 Kirchoff's Laws and Wheatstone bridge - Condition for balance.
No derivation required.

**04.03 Magnetic Effect [02]**

04.03.01 Biot-Savart's Law, Expression for magnetic induction & direction of magnetic induction.

04.03.02 Expression for magnetic induction due to an infinitely long conductor carrying electric current.
No derivation required.

04.03.03 Expression for magnetic induction due to Circular Coil carrying electric current,
- at centre of the coil &
- at a point on the axis of the coil.

No derivation required.

**04.04 Heating Effect [02]**

04.04.01 Heat developed in a current carrying conductor - expression.

04.04.02 Electrical Power & energy and their units.

04.04.03 Specifications marked on electrical appliances - Wattage & Voltage.

04.04.04 Resultant power (Total power) consumed in parallel combination of electrical appliances.
Kilo watt hour (Kwh) and electrical unit.
Expressions only.
No derivation required.

04.04.05 Simple numericals based on formulas.

**04.05 Electromagnetic Induction [02]**

04.05.01 Magnetic Flux - Definition & Unit.

04.05.02 Electromagnetic Induction - definition.

04.05.03 Faraday's Law & Lenz's Law of Electromagnetic Induction.

04.05.04 Eddy (Focault's) Current & its used in induction furnace and braking (stopping) of rotating wheels.

**04.06 Alternating Current [03]**

04.06.01 Uniform rotation of a coil in uniform magnetic field - Derivation of expression for e.m.f. induced.

04.06.02 Peak Value & R.M.S. Value of A.C.
Rated Value - R.M.S. Value.

04.06.03 Expressions for e.m.f. and curent in A.C. Circuit containing:
- resistance only
- Inductance only
- capacitance only

Expressions only. No Derivation required.

04.06.04 Choke Coil - Simple introduction.

04.06.05 Transformer & losses in it - Simple ideas.

**TOPIC: 05 - MODERN PHYSICS: [10]**

**05.01 Atomic Structure [01]**

05.01.01 Bohr's atomic model.

05.01.02 Stationary orbits & energy levels.

05.01.03 Transition of electron between two orbits - emission of electromagnetic radiation, Expression for wavelength of emitted radiation.
No derivation required.

05.01.04 Simple numericals based on formulas.

**05.02** **Thermionic Emission** **[01]**

05.02.01 Thermionic emmission and Diode Valve.
05.02.02 Half Wave rectifier.

**05.03** **X-Rays** **[01]**

05.03.01 Simple ideas of production of X-ray (No Diagram needed), Soft & hard X-rays.
05.03.02 Expression of minimum wavelength.
05.03.03 Use of X-ray in medicine & industry.
05.03.04 Simple numericals based on formulas.

**05.04** **Photoelectric Effect** **[02]**

05.04.01 Definition, Photon and its energy.
05.04.02 Threshold frequency
05.04.03 Effect of Intensity & Energy of incident light on Photoelectric effect.
05.04.04 Use of Photoelectric effect:
- medical use in Glucometer (Blood Sugar Measurement)
- Exposure meter
- Density measurement of exposed X-ray & photo films
- Television telecasting

05.04.05 Simple numericals based on formulas.

**05.05** **Radioactivity** **[01]**

05.05.01 Definition, Radioactive Decay and its formula - Half life time.
05.05.02 Types of radiations emitted from radioactive materials
05.05.03 Fission and Fusion - Simple ideas.
05.05.04 Principle of nuclear reactor and Stellar energy (energy from star)
05.05.05 Simple numericals based on formulas.

**05.06** **Ultrasonics** **[01]**

05.06.01 Definition
05.06.02 Piezo electric effect - Simple ideas (No diagram).
05.06.03 Uses in medicine and industry - simple ideas.

**05.07** **Laser & Optical Fibre** **[01]**

05.07.01 Introduction & Working principle - simple ideas.
05.07.02 Uses in medicine & industry - simple ideas.

**05.08** **Semiconductor** **[02]**

05.08.01 Intrinsic & Extrinsic Semiconductor - simple ideas.
05.08.02 Tetravalent Structure of intrinsic semiconductor.
Doping material (Impurity) trivalent & pentavalent.
05.08.03 PN junction & simple introduction of forward and reverse bias.

**TOPIC: 06 - ENVIRONMENT & SAFETY: [02]**

**06.01** **Environment & Safety**

06.01.01 Noise pollution and its effect on human health.
06.01.02 Radiation Hazards and Safety thereof.
06.01.03 Non conventional Energy- Solar Energy, Solar battery Cell, Wind Energy, Geothermal Energy.

**Books Recommended for Engineering Physics:**

**Text Books:**

| | | |
|---|---|---|
| 1 | Introductory Physics (Vol. I & II) | - By N.N. Ghosh |
| 2 | Intermediate Physics (Vol. I & II) | - By Durga Pd. Singh |
| 3 | Physics for Class XI & XII Part I | - By N.K. Bajaj (Tata McGraw Hill) |

**Reference Books:**

| | | |
|---|---|---|
| 4 | University Physics | - By Sears & Zeemansky |
| 5 | Physics Part I & Part II | - By Halliday & Resnik |
| 6 | Applied Physics Vol. I & II | - By TTTI Chandigarh, (Tata McGraw Hill) |
| 7 | Concepts of Physics Vol. I & II | - By H.C. Verma |
| 8 | Intermediate Physics | - By S.C. Roy Chowdhary & Dr. D.B. Singh |
| 9 | Intermediate Physics | - By Lakhmer Singh & Subramaniam |
| 10 | I.Sc. Physics Vol. I & II | - By V.P. Bhatnagar (Pitambar Publishing Co., New Delhi) |

# BASIC ENGINEERING DRAWING

| Subject Code | Theory | | | No of Period in one session : 120 | | |
|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 |
| P01203 | L | T | P/S | Annual Exam. | : | 80 |
| | 12 | — | — | Internal Exam. | : | 20 |

**Rationale and Objective:**

Drawing is said to be the language of engineers. All material objects have a shape and form, which can be represented by a combination of known geometrical figures. A thorough grounding in drawing to represent these objects on a plane is considered very essential for Diploma holders. Any construction or fabrication be it be a building, a factory or a machine has to begin with a drawing which forms the basis and guide to get the work done.
Drawing is commonly used mode of communication in the engineering industry. Proper exposure to drawing helps the students to translate different ideas into practice. Acquisition of skill will produce a drawing to represent a given object with sufficient knowledge to understand and interpret. As such drawing is regarded a pre-requisite for technician engineer.
With these objectives in view the following topics have been prescribed.

| S.No. | Topic | Periods | No. of Plates |
|---|---|---|---|
| 7. | Introduction | (06) | |
| 8. | Lettering, Numbering & Dimensioning | (12) | 01 |
| 9. | Conic Section | (24) | 01 |
| 10. | Orthographic Projection | (39) | 04 |
| 11. | Section views | (12) | 01 |
| 12. | Isometric | (15) | 01 |
| 13. | Development of Surfaces | (12) | 01 |
| | | **(120)** | **9 sheets** |

**CONTENTS:**

**TOPIC: 01 - Introduction:** **[06]**

| | |
|---|---|
| 01.01 | Importance of Engineering Drawing as graphic communication. Link between engineering drawing and other subjects of study in diploma course. |
| 01.02. | I. S. specification for preparation of drawings. |
| 01.03 | Use of drawing instruments and materials. Basic Tools- classification and brief description. |
| 01.04 | Special tools- Mini-drafter. Drafting Machine. |
| 01.05 | Scales, Recommended, reduced & enlarged scale. |
| 01.06 | Lines, Types of lines, Selection of line thickness. |
| 01.07 | Selection of Pencils. |
| 01.08 | Drawing sheets, different sheet sizes and standard layouts. Title block as per I. S. specification. |
| 01.09 | Care and maintenance of drawing material |

**TOPIC: 02 - LETTERING, NUMBERING & DIMENSIONING:** **[12]**

| | |
|---|---|
| 02.01 | Importance of lettering. Different types of lettering as per B.I. S. code. Capital and small letters of vertical & slanting type as per B.I. S. code. |
| 02.02 | Numerical figures of vertical and slanting type as per B.I. S. code. Single stroke and double stroke, advantages. |
| 02.03 | Necessity of dimensioning. Principles and method of dimensioning and dimensioning practice as per I. S. I. code. |
| 02.04 | Making of centre line, Section line, dimensioning lines etc. |
| 02.05 | Drawing of plain and diagonal scales and dimensioning practice. |
| | Tutorial & test (02) |

**TOPIC: 03 - CONIC SECTION: [24]**

03.01 Concept of Drawing and concept of conic section and its simple properties.
03.02 Concept of ellipse and its construction by various methods. Drawing of tangent & normal on ellipse.
03.03 Concept of parabola and its construction by various methods. Drawing of tangent & normal to parabola.
03.04 Concept of hyperbola and its construction by various methods. Drawing of tangent & normal to hyperbola.
Tutorial & Test (06)

**TOPIC: 04 - ORTHOGRAPHIC PROJECTIONS : [39]**

04.01 Principles of orthographic projection. Concept of horizontal, vertical and auxiliary planes. 1st angle and 3rd angle projection.
04.02 Projection of points on horizontal, vertical and auxiliary planes and its implication.
04.03 Projection of lines on different planes, Length of line and its true inclination with different planes and its traces.
04.04 Concept of orthographic projection of planes.
04.05 Projection of solids (Prism, Cone, Pyramids, Cylinder, Cube and tetrahedron etc.).

Tutorial & Test

| | |
|---|---|
| Projection of Point and straight line | 01 sheet |
| Projection of Planes and straight line | 01 sheet |
| Projection of solids and straight line | 02 sheet |
| | **04 sheet** |

**TOPIC: 05 - SECTION VIEWS & AUXILIARY VIEWS : [12]**

05.01 Concept of sectioning and drawing section lines, Need for drawing sectional views.
05.02 Section of simple geometrical solids-cases involving different types of cutting planes, single plane only
Tutorial & test (2)

**TOPIC: 06 - ISOMETRIC, PICTORIAL [15]**

06.01 Introduction to pictorial drawing. Brief description of different types of pictorial drawing viz Isometric, and their applications.
06.02 Concept of Isometric views. Isomeric Projection and Isometric Scale.
06.03 Isometric Projection of simple solids, frustum of solids, truncated solids and sets of simple solids.
Tutorial & test (03)

**TOPIC: 07 - DEVELOPMENT OF SURFACE: [12]**

07.01 Development of surfaces of Cylinders, Prisms, Pyramids, cones and their frustum only.
Tutorial & test (02)

**Books Recommended:**


1. Descriptive Geometry - Abbot
2. Elementary Engineering Drawing - N. D. Bhatt
3. Elementary Engineering Drawing - S. C. Sharma
4. Gyameetic Aarekhan (Hindi) - Dadan, Ravindra, Daya Shankar Srivastava
5. I.S.I. Specification on drawing -
6. Engineering Drawing - R. K. Dhawan
7. Engineering Drawing - P. S. Gill
8. Engineering Drawing - Parkinson
9. I. S.M. & S. S. M. on Technical Drawing - T. T. T. I., Madras

# ELEMENTARY MECHANICAL ENGINEERING AND ENGINEERING MATERIAL

| Subject Code | Theory | | | No of Period in one session : 60 | | |
|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 |
| | L | T | P/S | Annual Exam. | : | 80 |
| P01104 | 06 | - | - | Internal Exam. | : | 20 |

**Rationale & Objective:**

The technicians have to handle and deal with so many materials to be used in construction of Engineering product and making machine tools and structures etc. They have to face many problems involving general mechanical, electrical, electronics and civil Engg. As such the knowledge of general Engg. principles of different branches is essential for a Diploma holder.

The course has been designed with a view to include various materials commonly used in Engineering Constructions and general principles of working of different machine tools.

| S.No. | Topics | Periods |
|---|---|---|
| **GROUP - A (Mechanical Engineering)** | | |
| 1. | Simple machines | (06) |
| 2. | Introduction of ferrous & Non ferrous metals | (05) |
| 3. | General Process | (03) |
| 4. | Heat Engines & fluid machines | (06) |
| 5. | Power Transmission | (07) |
| 6. | Boilers | (03) |
| | Seperate answer books for group A & group B should be given in examination & answer books should be examination by Mechanical & Civil Engg. Teachers separately. | **[30]** |
| **GROUP - B (Engineering Material)** | | |
| 7 | Stones | (03) |
| 8. | Clay Products | (03) |
| 9. | Cement & their products | (05) |
| 10. | Timber | (03) |
| 11. | Miscellaneous Material | (16) |
| | | **(30)** |

**CONTENTS:**

**GROUP - A (MECHANICAL ENGINEERING)**

**[06]**

**TOPIC: 01 – SIMPLE MACHINES**

Introduction to simple machines, M.A, U.R, & ŋ of simple wheel & Axle, Compound wheel & Axle, Screw jack, worm & worm wheel, Rack & pinion (simple numericals only)

**TOPIC: 02 -: INTRODUCTION TO FERROUS & NON FERROUS METALS** **[05]**

Physical & mechanical properties & uses of ferrous metals &Alloys & non ferrous metals like,Al, Cu, Zn, & their alloys Properties & uses.

**TOPIC: 03 -: GENERAL PROCESS**

03.01 Introduction to Soldering, brazing & welding. **[03]**
03.02 Application of soldering, brazing & welding.
03.03 Flame Cutting and Welding.
03.04 Different types of flames used
03.05 Safety precautions in Welding.

**TOPIC: 04 - HEAT ENGINES & FLUID MACHINES** **[06]**

4.01 Introduction to External & Internal Combustion engines.

04.02 Difference between External & Internal Combustion engines.

04.03 Concept of Heat work and Energy. Thermodynamic system and their properties. (Introduction only)

04.04 Introduction of Two-stroke and four-stroke I.C. engine, their working principles. water wheel, Introduction to Inpulse & reaction turbine ,(Pelton, francis & Kaplan Turbine, working Principle only.)

**TOPIC: 05 - POWER TRANSMISSION** **[07]**

05.01 Power transmission by belt

05.02 Rope chain & geardrive

05.03 Open & cross belt drive

05.04 Relation between tight side & slack side tension

05.05 Centrifugal tension, simple & compound

05.06 Gear drive, gear train.

**TOPIC: 06 – BOILERS(Steam Generatars)** **[03]**

06.01 Classification of boilers - Fire tube & water tube boiler. Working principle of classification boilers,working principle of cochran boiler.

06.02 Boiler accessories & Mounting, their functions.

**GROUP - B (ENGINEERING MATERIAL)**

**TOPIC: 07 - STONES:** **[03]**

07.01 Introduction of stones as engineering materials

07.02 Classification of Rocks, qualities, selection and uses of different types of stones in various engineering construction works.

07.03 List of tests on stones,
- Dressing of stones & quarrying of stones.

**TOPIC: 08 - CLAY PRODUCTS:** **[03]**

08.01 Common Clay products, (Vitrified, Porcelain) their manufacture and application.

08.02 Uses of brick and characteristics of good bricks.

**TOPIC: 09 - CEMENT & THEIR PRODUCTS** **[05]**

09.01 Lime:
- Introduction , Manufacturing Process
- Different types of limes & its applications,

09.02 Cement:
- Introduction, Manufacturing process
- Different types of cements, their ingredients and applications, grade of cements, storage of cement.
-

**TOPIC: 10- TIMBER** **[03]**

10.01 Classification of Timber

10.02 Characteristics of good timber

10.03 Introduction of seasoning of timber

10.04 Preservation of timber and its uses

**TOPIC: 11 - MISCELLANEOUS MATERIALS** **[16]**

11.01 Plastics:
- Introduction, important commercial products of plastics used in engineering works
- Types of plastics - Themoplastic & Thermosetting, Epoxy Resins

11.02 Glass:
- Types of glass
- Composition of glass
- Uses of glass as industrial material

11.03 Adhesive:
- Types of Adhesive
- Its ingredients and uses sealant & joints fillers

11.04 Rubber:
- Characteristics of Rubber
- Types and uses of Rubber

11.05 Available forms of Aluminum as structural cladding & partition
Different type of bar section & their uses.

**Books Recommended:**

| | | |
|---|---|---|
| 1. | Workshop Technology | - By Hazare and Choudhary |
| 2. | Heat Engine | - By Pandey & Saha |
| 3. | Engineering Material | - By Banga & Sharma |
| 4. | Engineering Material | - By Narang |
| 5. | इंजीनियरिंग पदार्थ | - जनार्दन झा |
| 6. | Electrical Engineering | - By Uppal |
| 7. | वैद्युत अभियांत्रिकी | - डी॰आर॰ नारायण |

# ELECTRICAL & ELECTRONICS ENGINEERING

| Subject Code | Theory | | | No of Period in one session : 60 | | |
|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 100 |
| P01204 | L | T | P/S | Annual Exam. | : | 80 |
| | 06 | - | - | Internal Exam. | : | 20 |

**Rationale & Objective:**

The subject forms the foundation of electrical and electronics engineering. It prepares the students to familiarize with basic concepts and principles of electrical and electronics as these are encountered in every large and small installations of each type of industries. The diploma holders will be using machines and systems extensively which have electronics and electrical circuits inside. To understand their basic functioning, the students will be required to study the working principles, construction, characteristics, specifications and uses of basic devices and circuits.

Keeping in view the importance and relevance, this course has been developed and incorporated in the curriculum. The content has been divided into the following topics:-

**PART-A**

**Electrical Engineering (Annual Exam : 55 marks)**

| S. No. | Topics | Periods L | Periods T |
|---|---|---|---|
| **1.** | Electro-magnetism | 06 | 2 |
| **2.** | D.C. Circuits and D.C Machines | 09 | 3 |
| **3.** | A.C. Circuits and A.C Machines | 09 | 3 |
| **4.** | Storage Batteries & Wiring System | 04 | 1 |
| **5.** | Safety Procedures & Earthing | 02 | 1 |
| | **Total** | **30** | **10** |

**PART-B**

**Electronics Engineering (Annual Exam : 25 marks)**

| S. No. | Topics | Periods L | Periods T |
|---|---|---|---|
| **1.** | Semiconductor & Diodes | 08 | 02 |
| **2.** | Transistors | 10 | 01 |
| **3.** | Field effect transistor | 06 | 01 |
| **4.** | Digital Electronics | 06 | 01 |
| | **Total** | **30** | **05** |

**PART-A**

**Electrical Engineering**

**Contents :**

**Topic 1. -Electro-Magnetism** **(06)**

01.01 Concept of flux, flux density, Reluctance, permeability Analogy between Magnetic and Electrical circuits.

01.02 Statement and Explanation of Faraday's laws of Electromagnetic Induction Lenz's law, Fleming's Right hand rule, Fleming's left hand Rule.

01.03 Magnetic Hysteresis , Hystereris loss Eddy current, Eddy current loss.

01.04 Induced e.m.f. dynamically and statically.

01.05 Derivation of Force due to a current carrying straight conductor, Derivation of Force between two parallel current carrying Conductors.

**Topic 02. -D. C. Circuits and D.C Machines** **(09)**

02.01 Ohm's law and Laws of resistance. Concept of resistivity and conductivity, related problems.

02.02 Kirchoff's current laws and Kirchoff's Voltage law, related problems.

02.03 Star-delta transformation, Thevenin's theorem, Norton's theorem, , Maximum power transfer theorem. Related simple problems

02.04 Construction, Principle and working of D.C Generator

02.05 Principle and working of D.C. motors .

**Topic 03. - A.C. Circuits and A.C Machines** **(09)**

03.01 Fundamental Concept of Alternating current and voltage, difference between A.C. and D.C. concept of cycle, Frequency, time period, amplitude, instantaneous value. Average value. R.M.S. value peak factor & form factor, simple problems.

03.02 Concept of phase and phase difference. Impedance and Reactance laggings and leading A.C. waves.

03.03 Alternating voltage applied to pure resistance, pure inductance and pure capacitance, Power factor, simple problems.

03.04 Basic idea of single phase transformer, EMF equation, turn ratio & Transformation ratio, simple problem

**Topic 04. - Storage Batteries & Wiring System** **(04)**

04.01 Primary and Secondary Cell.

04.02 Construction of Lead Acid accumulator.

04.03 Maintenance of Battery.

04.04 Study of Battery chargers.

04.05 Types of House wiring with different items used like switches, Socket fuse etc. ( Brief idea only)

**Topic 05. –Safety Procedures and Earthings** **(02)**

05.01 Effects of Shocks and burns, Causes of Electrical Shocks

05.02 Methods / Procedures to be adopted for Safety of human being and Safety of machines against electrical Shocks/ hazards

05.03 Brief Idea of earthing and its importance.

## PART-B

## Electronics

**Topic: 01 - Semiconductor and Diodes** **[08]**

01.01 Conductors, Semiconductors, insulators, differences between them, based on energy band diagram.

01.02 Conduction in intrinsic and extrinsic semiconductors. Concept of electrons and holes, Donor and acceptor impurities. P and N type semiconductors and their conductivity, effect of temperature on conductivity.

01.03 P-N Junction diode, Forward and Reverse bias, characteristics of P-N Junction and effect of Temperature, Reverse breakdown voltage.

01.04 Diode (P N Junction) as rectifier, Half wave, Full wave and bridge rectifier.

01.05 Zener Diode and its application.

01.06 Photo diodes.

01.07 Light Emitting diode.

**Topic: 02 – Transistors** **[10]**

02.01 Concept of Bipolar Transistor, PNP and NPN Transistors, Transistor action, Transistor configurations, characteristics modes of operation.

02.02 Transistor as an amplifier. Classification of Amplifiers, CB, CC and CE amplifiers, Input and Output characteristics of amplifiers. ( Basic idea)

02.03 Hybrid equivalent circuit for a bipolar Transistor, h-parameters, current gain, input impedance, voltage gain, output impedance, power gain.

**Topic: 03 - Field Effect Transistor** **[06]**

03.01 Classification, merits and demerits, basic construction, principles of operation, characteristics, equivalent circuit of JFET and its application.

03.02 Construction, principle of operation of MOSFET Enhancement mode, Depletion mode, characteristics & its application.

03.03 Comparison of JFET, MOSFET, BJT.

03.04 Basic idea of thyrister.

**Topic: 04 - Digital Electronics** **[06]**

04.01 Basic ideas about-

- Basic gates, Number system, Boolean Algebra, (DeMorgon's Theorem)
- Familiarity with their application.

**Recommended Books**

| SL | Title | | Author / Publisher |
|---|---|---|---|
| 1. | Electrical Technology | - | B. L. Threja-S. Chand & Co. |
| 2. | Basic Electrical Engg. | - | V.K. Mehta. |
| 3. | Electronics | - | V.K. Mehta. |
| 4. | Electrical Technology | - | Edward Hyghes |
| 5. | Basic Electrical Engineering | - | P.S. Dhogal-McGraw Hill Publisher |
| 6. | Basic Electrical Engineering | - | J. B. Gupta-S. K. Kataria & Sons |
| 7. | Basic Electricity | - | B. R. Sharma-Staya Prakashan, N. Delhi |
| 8. | Electronic Principles | - | Malvino-Tata McGraw Hill |
| 9. | Electronics & Radio Engineering | - | M. L. Gupta |
| 10. | Electronics Devices & Circuits | - | Millman & Halkias-McGraw Hill |
| 11. | Basic Electronics & Linear Circuits | - | N. N. Bhargava & Kulshreshta-Tata McGraw Hills, New Delhi |
| 12. | Basic Electronics | - | Grob-Tata McGraw Hill, New Delhi |
| 13. | Digital Electronics and Application | - | Malvino Leach-McGraw Hills, New Delhi |
| 14. | Introduction to Microprocessor | - | Dr. B. Ram, Fhanpat Ray & Sons |

# ENGINEERING PHYSICS (LAB.)

| Subject Code | Practical | | | No of Period in one session : 50 | | |
|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 50 |
| | L | T | P/S | Annual Exam. | : | 40 |
| P01106 | — | — | 04 | Internal Exam. | : | 10 |

At Least ten experiments to be performed:

**S.No.** **Experiment**

1. Determination of diameter using Slide Callipers.
2. Determination of depth using Slide Callipers.
3. Measurement of diameter of wire using Screw Gauge.
4. Measurement of thickness using Screw Gauge.
5. Determination of thickness of a plate using Spherometer.
6. Measurement of radius of curvature of a Convex Surface using Spherometer.
7. Study the relation between length of a Simple pendulum and square of its time period.
8. Measurement of resistance using Post Office Box.
9. Verification of Laws of Series and parallel grouping of resistances using P.O. Box.
10. Determination of resistance using meter bridge.
11. Study relationship between current and potential difference at different lengths of meter bridge (or potentiometer) wire.
12. Comparison of e.m.fs two cells using potentiometer.
13. Determination of angle of repose using inclined plane friction table and to find co-efficient of friction.
14. Study of junction diode.
15. Comparison of illuminating power (luminous intensity) of two light sources using Photoelectric Cell.

**Books Recommended for Engineering Physics (Lab.):**


1 Practical Physics - By N.N. Ghosh
2 Practical Physics - Sharma Singh & Prasad
Bharti Bhawan Publication
3 Practical Physics - By Durga Pd. Singh
4 Practical Physics - By C.L. Arora
S. Chand & Co.
5 Practical Physics - By K.K. Mahindroo
Pitambar Publishing Co., New Delhi

# BASIC ENGINEERING DRAWING

| Subject Code | Sessional | | | No of Period in one session : | | |
|---|---|---|---|---|---|---|
| | No. of Periods Per Week | | | Full Marks | : | 50 |
| | L | T | P/S | Annual Exam. | : | 30 |
| P01208 | — | — | — | Internal Exam. | : | 20 |

| S.No. | Topic | No. of Plates |
|---|---|---|
| 1 | Lettering, Numbering & Dimensioning | 01 |
| 2 | Conic Section | 01 |
| 3 | -Projection of Points & Straight Lines | 01 |
| | -Projection of planes | 02 |
| | -Projection of solids | 01 |
| 4 | Sectional views | 01 |
| 5 | Isometric | 01 |
| 6 | Development of Surface | 01 |
| | | **09 Plates** |