

PHYSICS & MATHS TRADE SYLLABUS FOR RAILWAY ALP 2ND STAGE EXAM (PART-2)

PHYSICS
<p>Centre of gravity:- Centre of gravity concept and C.G. of the different lamina. Equilibrium different kinds of stable, unstable and neutral. Law of parallelogram force , Triangle law, Lami's theorem stable, Definition of specific gravity, density and relative density , Calculation of density of a body.</p>
<p>Friction:- Laws of friction, coefficient of friction, angle of friction, simple problems related to friction. Lubrication Concept on terms like pressure, atmospheric pressure, gauge pressure. Heat treatment necessity difference methods.</p>
<p>Pressure:- Pneumatic pressure, PSI, bar, atmospheric pressure, pressure gauge and absolute pressure, Heat treatment process. Power transmission by shaft, belts and ropes. Gauge pressure – gauges used for measuring pressure</p>
<p>Magnetism:- Magnetic material, magnetic field, flux density, magnetic moment, m.m.f. Reluctance, permeability, susceptibility, electromagnet, solenoid and its practical applications. Magnetism - Classification of magnets, methods of magnetising, magnetic materials. Properties, care and maintenance. Para and Diamagnetism and Ferro magnetic materials. The principle of electromagnetism, Maxwell's corkscrew rule, Fleming's left and right hand rules, Magnetic field of current carrying conductors, loop and solenoid. MMF, Flux density, reluctance. B.H. curve, Hysteresis, Eddy current. Principle of electromagnetic Induction, Faraday's Law, Lenz's Law. Electrostatics: Capacitor- Different types, functions and uses. Permanent Magnets and Electromagnets</p>
<p>Material:- Introduction, types and properties. Uses of Conducting, Semi-conducting and insulating materials</p>
<p>Elasticity:- Stress, strain, Modulus of elasticity, elastic limit, Hooks law, young's modulus. Elastic & Plastic material. Stress & strain and their units. Young's modules. Ultimate stress and breaking stress.</p>
<p>Material Science:- Definition, properties (physical & mechanical) and uses of Metal, Non-metal, Alloy & Insulator. Introduction, types and properties. Uses of Conducting, Semiconducting and insulating materials. Types of ferrous and Nonferrous metals. Difference between Ferrous and Non-Ferrous metals.</p>
<p>Mass, Weight and Density:- Mass, Unit of Mass, Weight, the difference between mass and weight. Density, unit of density. The relation between mass, weight & density. Simple problems related to mass, weight, and density. Definition of speed, velocity & acceleration and their units. Difference between speed & velocity. Simple problems.</p>
<p>Heat & Temperature:- Heat and temperature, their units, the difference between heat and temperature, boiling point, melting point, Scale of temperature, the relation between the different scale of temperature. Thermometer,</p>

pyrometer. Transmission of heat, conduction, convection, radiation. Latent heat, sensible heat, saturated steam, wet steam, superheated steam. Reynolds's number, calculation of Reynolds's number at different velocities,

Basic Electricity:-

Introduction and use of Electricity. AC, DC & their comparisons. Current, Voltage, Resistance & their units. Power, Energy & their units. Insulator and conductors & their uses.

Corrosion:-

What is corrosion? Difference between corrosion and rancidity. Precaution to avoid corrosion. Electroplating process

Circular Motion:-

The relation between circular motion and Linear motion, Centrifugal force, Centripetal force

Simple machines:-

Pulley block, inclined plane, simple wheel and axle, differential wheel and axle, simple screw jack, 10. Stress-Strain graph. Modulus of Rigidity. Poisson's Ratio, Bulk modulus, Related problems.

Motion & Force:-

Newton's laws of motion, unit of force, find out resultant force, space and vector diagram, representation of force, parallel force, couple, parallelogram law of forces, condition of equilibrium, kind of equilibrium, some examples of equilibrium in daily , Introduction, Different types of stresses, Hooke's law, Young's modulus or modulus of elasticity, yield point, factor of safety, stress-strain graph, Modulus of rigidity, Poisson's ratio, Calculation (i.e. stress, strain, young modulus, factor of safety)y life, Lami's theorem. Resolution and composition of forces. Representation of force by vectors, simple problems on lifting tackles like jib wall, crane-Solution of problems with the aid of vectors.The general condition of equilibriums for series of forces on a body.

Electric charges and fields:-

Introduction, Electric Charges ,Conductors and Insulators ,Charging by Induction , Basic Properties of Electric Charge ,Coulomb's Law , Forces between Multiple Charges , Electric Field ,Electric Field Lines, Electric Flux , Electric Dipole ,Dipole in a Uniform External Field , Continuous Charge Distribution , Gauss's Law , Application of Gauss's Law

Alternating Current:-

Comparison and Advantages, D.C and A.C. Related terms, frequency, Instantaneous value, R.M.S. value Average value, Peak factor, form factor. Generation of a sine wave, phase and phase difference. Inductive and Capacitive reactance Impedance (Z), power factor (p.f). Active and Reactive power, Simple problems on A.C. circuits, single Phase and three-phase system etc. Problems on A.C. circuits. Power consumption in series and parallel, P.F. etc. Concept three-phase Star and Delta connection. Line and phase voltage, current and power in a 3 phase circuits with the balanced and unbalanced load. AC Voltage Applied to a Resistor Transformers LC Oscillations AC Voltage Applied to an Inductor, AC Voltage Applied to a Capacitor Power in AC Circuit: The Power Factor AC Voltage Applied to a Series LCR Circuit Representation of AC Current and Voltage by Rotating Vectors — Phasors

Electrostatic Potential and Capacitance :-

Electrostatic Potential Potential due to a Point Charge Potential due to an Electric Dipole Potential due to a System of Charges Equipotential Surfaces Potential Energy of a System of Charges Potential Energy in an External Field Electrostatics of Conductors Dielectrics and Polarisation Capacitors and Capacitance The Parallel Plate Capacitor ,Effect of Dielectric on Capacitance Combination of Capacitors Energy Stored in a Capacitor Van de Graaff Generator

Current Electricity:-

Introduction Electric Current Electric Currents in Conductors Ohm's law Drift of Electrons and the Origin of Resistivity Limitations of Ohm's Law Resistivity of various Materials Temperature Dependence of Resistivity Electrical Energy, Power Combination of Resistors — Series and Parallel Cells, emf,

Internal Resistance Cells in Series and in Parallel Kirchoff's Laws Wheatstone Bridge Potentiometer

Moving Charges and Magnetism:-

Magnetic Force Motion in a Magnetic Field Motion in Combined Electric and Magnetic Fields Magnetic Field due to a Current Element, Biot-Savart Law Magnetic Field on the Axis of a Circular Current Loop Ampere's Circuital Law The Solenoid and the Toroid Force between Two Parallel Currents, the Ampere Torque on Current Loop, Magnetic Dipole The Moving Coil Galvanometer

Mathematics

Simplification:-

BODMAS rule Fraction-Addition, Subtraction, multiplication and Division-Problem solving, Decimal-Addition. Simple calculation using Scientific Calculator. Fraction, Decimal fraction, LCM, HCF, multiplication and division of fraction. Conversion of decimals into fraction and vice versa. Square and square root, method of finding out square roots. Simple problem using calculation

Ratio & Proportion:-

Simple calculations & related problems solving, , question on alligation and mixture , questions on ages

Percentage:

Introduction, Simple calculation. Changing percentage to fraction and decimal & vice-versa.

Basic Algebra:

Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations(with two variables).

Mensuration :

Formulae for Perimeter and Area of Plane figure - Rectangle, Square, Parallelogram, Triangle, Hexagon, any regular polygon, Trapezium, Circle, sector, Fillet, Ellipse, segment of a circle , Volume of solids - cube, cuboid, cylinder and Sphere. Surface area of solids - cube, cuboid, cylinder and Sphere. Area of cut-out regular surfaces: circle and segment and sector of circle. Area of irregular surfaces. Formulae for Volume and surface area of solids- Rectangular solid, Prism, cylinder, pyramids and cones, Frustum of pyramid and cones, sphere, Hollow sphere, segment of sphere, circular ring, spherical sector, Calculation of volume and weight of simple solid bodies such as cubes, square and hexagonal prism-shop problem.

Indices:

Laws of indices related problems.

Profit & Loss.

Simple and compound interest.

Trigonometry:-

Finding the value of unknown sides and angles of a triangle by the Trigonometrical method. Finding height and distance by trigonometry. Application of trigonometry in shop problems. (viz. taper angle calculation).Using sines, cosines and tangents to solve vehicle problems.

Graph:-

Read images, graphs, diagrams , bar chart, pie chart , Graphs: abscissa and ordinates, graphs of straight line, related to two sets of varying quantities.

Simple problem on Statistics:

Frequency distribution table , Calculation of Mean value , Examples on mass scale productions , Cumulative frequency ,Arithmetic mean

Factorisation and quadratics:-

multiply expressions in brackets by a number, symbol or by another expression in a bracket; by

extraction of a common factor eg $ax + ay$, $a(x + 2) + b(x + 2)$; by grouping eg $ax - ay + bx - by$; quadratic expressions eg $a^2 + 2ab + b^2$, roots of an equation eg quadratic equations with real roots by factorisation, and by the use of formula

Geometry:-

division of line segment, parallel lines, similar angles, perpendicular lines, Use of scientific calculator,/logarithmic table Angles -Angular measurement, Angles and rotation, Examples of angles in automotive work, Adding and subtracting angles. Types of angle- Adjacent angles, Opposite angles, Corresponding angles, Alternate angle, Supplementary angles, Complementary angles, Trigonometry-Types of triangle - Acute angled triangle, Obtuse angled triangle, Equilateral triangle, Isosceles triangle, Scalene triangle, Right angled triangle, Labelling sides and angles of a triangle, Sum of the three angles of a triangle. Pythagoras' theorem, Circles, Ratio of diameter and circumference, Length of arc, Timing marks, Wheel revolutions and distance travelled, Valve opening area.

Statistics:-

Collecting and sorting raw data, Definition of Discrete variable, continuous variable with Shop examples. Constructing pictographs-pie chart, Bar chart. Frequency and tally Charts. Importance of the shape of a frequency distribution- histogram, frequency polygon, Cumulative frequency plot. Interpreting statistics- sampling, arithmetic mean, median, mode, Range. Graphs- variables, scales, coordinates, straight line graphs.

Relations and Functions:-

Types of Relations Types of Functions Composition of Functions and Invertible Function Binary Operations

Inverse Trigonometric Functions:-

Basic Concepts, Properties of Inverse Trigonometric Functions

Matrices:-

Matrix, Types of Matrices, Operations on Matrices, Transpose of a Matrix, Symmetric and Skew-Symmetric Matrices, Elementary Operation (Transformation) of a Matrix Invertible Matrices



Adda 247
Test Series



ASSISTANT LOCO PILOT 2018
STAGE -II

• 10 FULL-LENGTH MOCKS (PART A)

Bilingual