

9.1 CORE SKILL – WORKSHOP CALCULATION & SCIENCE

S No.	Description- Workshop Calculation	Description - Workshop Science
1st Semester		
1	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Material Science: properties -Physical & Mechanical, Types -Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.
2	Fractions: Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	Mass .Weight and Density : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.
3	Square Root: Square and Square Root, method of finding out square roots, Simple problem using calculator. Ratio & Proportion : Simple calculation on related problems.	Speed and Velocity: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.
4	Percentage: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.
2nd Semester		
1	Algebra: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Heat & Temperature: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat, conduction, convection, radiation.

2	Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids - cube, cuboid, cylinder and Sphere. Surface area of solids -cube, cuboid, cylinder and Sphere.	Basic Electricity: Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections - series, parallel, electric power, Horse power, energy, unit of electrical energy.
3	Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables.	Levers and Simple Machines: levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.
3rd Semester		
1	Use of Scientific Calculator: Practice on solving different problems like phase angle, etc. with the help of a calculator.	Matter, forms, specific properties related to solids, liquids and gases. The atom, molecule. Difference between an element and compound.
2	Algebra: Theory of Indices, related problems. Factorization -different method. Quadratic equations and solution of simultaneous equations with 2/3 unknowns. Different types of related problems involving equations.	Electrical Engineering materials: Properties and uses in electrical field of important materials to be selected from 3 categories as conducting materials, semi-conducting materials, Insulating materials. Insulating materials including transformer oils.
3	Trigonometry: Application in calculating height and distances. Use of trigonometric formulae in calculating areas of geometrical figures. Solution of Triangles.	Magnetism: Introduction Magnetic Material for permanent magnet, temporary magnet etc. Magnetic field, flux density, permeability, susceptibility – explanation and units of the above terms. Electromagnet (Solenoid) – practical applications.
4	Mensuration: Volumes and surface areas of solid bodies such as triangular prism, hexagonal prism etc. Volumes and surface area of pyramids including cone.	Concept of terms like pressure, atmospheric pressure, gauge pressure. Heat treatment – Necessity – different methods.
4th Semester		

1	<p>Number system: decimal and binary, Octal Hexa decimal. BCD code, conversion from decimal to binary and vice-versa, all other conversions. Practice on conversions.</p>	<p>Friction: Laws of friction, co-efficient of friction, angle of friction, simple problems related to friction. Lubrication</p> <p>Rectifier: RMS. Maximum, Average values of voltage and current in rectifiers form factor, ripple factor.</p>
2	<p>Estimation & costing: Simple estimation of the requirement of materials etc. as applicable to the trade. Problems on estimation and costing.</p> <p>Further Mensuration: Volumes of frustums including conical frustums. Graph- Basics, abscissa, co-ordinate etc. $Y = mz$ and $Y = mx + c$ graph</p>	<p>Forces: 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. General condition of equilibriums for series of forces on a body. Law of parallelogram, Triangle Law, Lami's Law theorem.</p>
3	<p>Simple Problems on Profit & Loss. Simple and compound interest.</p>	<p>Centre of gravity: Centre of gravity concept and C.G. of different lamina. Equilibrium different kinds stable, unstable and neutral. Law of parallelogram force. Triangle law, Lami's theorem stable, unstable and neutral equilibrium.</p>

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