

JUNIOR INSTRUCTOR – ARITHMETIC CUM DRAWING

TENTATIVE SYLLABUS

WORKSHOP SCIENCE & CALCULATIONS

Unit, Fractions

Classification of unit system, Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units, Measurement units and conversion Factors, HCF, LCM and problems. Fractions - Addition, subtraction, multiplication & division, Decimal fractions - Addition, subtraction, multiplication & division

Square root, Ratio and Proportions, Percentage:

Square and square root, square root - Applications of pythagoras theorem and related problems, Ratio and proportion - Direct and indirect proportions, Percentage - Changing percentage to decimal and fraction.

Material Science

Material science - Types metals, types of ferrous and non-ferrous metals- Physical and mechanical properties of metals - Introduction of iron and cast iron- Difference between iron & steel, alloy steel and carbon steel - Properties and uses of rubber, timber and insulating materials

Mass, Weight, Volume and Density

Mass, volume, density, weight and specific gravity, and its Related problems

Speed and Velocity, Work, Power and Energy

Speed and velocity - Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation
Speed and velocity - Related problems on speed & velocity, Work, power, energy, HP, IHP, BHP and efficiency,
Potential energy, kinetic energy and related problems

Heat & Temperature and Pressure

Heat & Temperature - Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals - Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature - Temperature measuring instruments, types of thermometers, pyrometer and transmission of heat - Conduction, convection and radiation - Co-efficient of linear expansion and related problems - Problem of heat loss and heat gain with assignments - Thermal conductivity and insulators, Concept of pressure - Units of pressure, atmospheric pressure, absolute pressure, gauge pressure and gauges used for measuring pressure

Basic Electricity

Basic electricity - Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC, DC their comparison, voltage, resistance and their units - Conductor, insulator, types of connections - series and parallel - Ohm's law, relation between V.I.R & related problems- Electrical power, energy and their units, calculation - Magnetic induction, self and mutual inductance and EMF generation - Electrical power, HP, energy and units of electrical energy

Mensuration

Mensuration - Area and perimeter of square, rectangle and parallelogram- Area and perimeter of Triangles - Area and perimeter of circle, semi-circle, circular ring, sector of circle, hexagon and ellipse Mensuration - Surface area and volume of solids - cube, cuboid, cylinder, sphere and hollow cylinder- Finding the lateral surface area, total surface area and capacity in liters of hexagonal, conical and cylindrical shaped vessels.

Levers and Simple machines

Simple machines - Effort and load, mechanical advantage, velocity ratio, efficiency of machine, relationship between efficiency, velocity ratio and mechanical advantage - Lever and its types

Trigonometry

Trigonometry - Measurement of angles - Trigonometrical ratios - Trigonometrical tables- Application in calculating height and distance (Simple applications)

Friction

Friction - Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, simple problems related to friction - Lubrication - Co- efficient of friction, application and effects of friction in workshop practice, Centre of Gravity and its practical application, Area of cut out regular surfaces - circle, segment and sector of circle, Related problems of area of cut out regular surfaces - circle, segment and sector of circle, Area of irregular surfaces and application related to shop problems

Algebra

Algebra - Addition, subtraction, multiplication & division - Theory of indices, algebraic formula, related problems

Elasticity

Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus - Ultimate stress and working stress

Heat Treatment

Heat treatment and advantages - Heat treatment - Different heat treatment process – Hardening, tempering, annealing, normalizing and case hardening

Profit and Loss

Profit and loss - Simple problems on profit & loss - Simple and compound interest

Estimation and Costing

Estimation and costing - Simple estimation of the requirement of material etc. - Problems on estimation and costing

ENGINEERING DRAWING

Engineering Drawing Introduction

Introduction to engineering drawing – Conventions -Views of engineering drawing sheets- Method of folding of printed drawing sheets as per BIS SP: 46-2003 - Drawing Instrument - Drawing board, T - square, drafter (drafting machine), Setsquares, protractor, scale, pencils

Lines

Lines - Definition, types and applications in drawing as per BIS: 46-2003 and classification of lines

Lettering & Numbering

Lettering and numbering - Single stroke, double stroke and inclined, Dimensioning and its Practice

Dimensioning - Definition, and its types, types of arrow heads and leader lines, Methods of dimensions and position of dimensioning (aligned, unidirectional)

Sizes and layout of drawing sheets

Sizes and layout of drawing sheets - Selection of sizes, title Block, its position & content

Projections

Projections - Concept of axes plane and quadrant - Orthographic projection- Method of 1st angle and 3rd angle projections (Definition and difference)- Symbol of 1st angle and 3rd angle projection as per IS specification

This is a tentative syllabus prepared as per NIMI syllabus. final syllabus will be published by Kerala PSC

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