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Department of Industries and Commerce
Syllabus for Industrial Extension Officers written test

Qualification as per existing C&R: Degree in Science or Commerce or Diploma in any branch of Engineering excluding Civil Engineering.

Degree in Science Syllabus

Unit-1: Physics

Elasticity, small deformations, Hooke's Law, elastic constants and relation among them, Beam supported at both the ends, cantilever, torsion of a cylinder, Maxwell's needle and Searl's method.

Streamline and turbulent flow, equation of continuity, viscosity, Poiseuille's law, critical velocity, Renold's number, Stoke's law and terminal velocity, Surface tension and surface energy, molecular interpretation of surface tension, pressure on a curved liquid surface.

AC circuits containing R, L & C, Impedance and admittance, Phasor diagram for current and voltage in AC circuits, Analysis of AC using operator, Series and parallel resonant circuits, Q-factor, Power consumed by an AC circuit, Choke coil.

Scalars and Vectors dot and cross product, Triple and Quadruple vector product of vector, scalars and Vector fields, Gradient of a scalar and Vector field, Gauss divergence theorem, Green's theorem and Stokes's theorem.

Definition of matrix, addition, Subtraction and multiplication of the matrices, Transpose of a matrix, symmetric and skew-symmetric matrix, Adjoint of a matrix, Hermitian matrices, Inverse of a matrix, Singular and non-singular matrices, Orthogonal matrices, Rank of a matrix.

Unit-2: Chemistry

Industrial applications of ethylene and propene, Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes, Structure of Butadiene, methods of formation, polymerization, Chemical reactions-1,2 and 1,4 additions, Diels-Alder reaction.

Methods of formation and chemical reactions of alkyl benzene, alkylbenzene, Alkyl and aryl halides, Nomenclature and classes of alkyl halides, methods of formation, chemical reactions, Mechanisms of nucleophilic substitution reactions of alkyl halides, SN_2 and SN_1 reactions.

Methods of formation of Aryl halides, nuclear and side chain reactions, The addition-elimination and elimination addition mechanisms of nucleophilic aromatic substitution reactions.

UNIT - 3: MATHEMATICS.

Number System – Set theory, Sequence, Matrices

Statistics – Variance and Standard deviation, Co-efficient of variation, Mean, Mode

Quadratic Equations - Identifying quadratic equation, pure and affected, standard form of quadratic equation, factorization, roots of the quadratic equation.

Factors and Factorisation – H.C.F and L.C.M

UNIT – 4 : SAFETY AND ENVIRONMENTAL ISSUES

1. Define Industrial accident and safety
2. Explain accident prevention, accident reporting and crisis management
3. List the safety provisions under Indian Factories Act
4. Explain Safety Management System-OSHAS 18001
5. ISO 14000 series and IS16949 & IS16959 certifications

UNIT – 5: INTERPERSONAL SKILLS.

1. Importance of knowing yourself-Process of knowing yourself.
2. SWOT analysis-Benefits of SWOT analysis
3. SWOT analysis grid and questions to complete the grid.
4. Importance of knowing others-Process of knowing others.
5. Resolving Win/Lose Situations into win/win through inter group communications.
6. Defining communication- Special features of communication.
7. Communication process- Channels of communication.
8. Formal and informal communication network.
9. Barriers to communication- Tips of effective communication.
10. Tips of powerful presentation- Art of public speaking- Importance of
11. public speaking- Benefits of public speaking- Public speaking tips.

UNIT 6: Business Plan Preparation :

Starting a business and What is a business plan? Set your goals (1) Review your business plan Why businesses fail? How to succeed? The Do's and Don'ts Business Plan Essentials – (2) Preparing a business plan Business plan outline (3) Formulate (and Reformulate) Business Plan Promoters, Constitution and Statutory Compliances – Promoters (4) Constitution Statutory compliances (5) Industry Analysis.

UNIT 7: Acts and Policies:

The Factories Act, 1948 1 The Industrial Disputes Act, 1947 2 Wage Legislation The Indian Contract Act The Indian Negotiable Instruments Act 3 The Indian Sale of Goods Act The Indian Partnership Act Social Legislation 4 Trade & merchandise marks Act Central-Excise 5 Sales Tax The Income Tax Act Pollution Control Act Indian Boiler Act 6 Explosive License Act Drugs and Cosmetics Manufacturing License, KVIC Act, Industrial facilitation act, IDR act, MSMED act, Industrial policy, Aerospace policy.

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Unit-1:

Financial Accounting

Objectives, Introduction to Accounting, Need for Accounting, Definition of Accounting, Book – Keeping and Accounting, Branches of Accounting, Systems of Book Keeping, Accounting Principles

Business organization and Office management

Meaning of Business and Organisation, Nature and scope of Business Organisation, Objectives of Business, Requisites of a successful Business, Qualities of a good businessman, Social Responsibilities of a business.

Company Law

Qualifications and Qualities of a company secretary, Statutory Qualifications, General or other Qualifications, Personal Qualities, Appointments of a company secretary

Unit-2:

Banking

Different types of Accounts, Demand Deposits, Time Deposits, Different types of Demand Accounts, Current Accounts, Savings Accounts, Different types of Time accounts, Fixed Deposit Account, Recurring Deposit Account, Kinds of Cheques, Reasons for Fraud, Detection of Fraud.

Human resource management:

Personnel Administration & Industrial Relation Functions, Functions Classified on the basis of Capacities, Functions according to the Degree of Authority, Functions of HR/Personnel Management, Organizational Planning and Development, Staffing and Employment, Training and Development, Compensation, Wage and Salary, Administration, Motivation and Incentives, Employee Services and Benefits, Employee Records, Labour and Industrial Relations, Personnel Research and Personnel Audit .

UNIT - 3:

Income Tax Law and Practice

Fully Exempted Income, Partially Exempted Income Allowances, Perquisites, Medical Benefits, Profit in Lieu of Salary, Provident Fund, Exemptions from House Property, Annual Value, Income Chargeable to tax under this head, General Principles for deductions from income, Procedure of filling of Return, Prescribed Forms of Return.

Cost Accounting

Branches of Accounting, Evolution of Cost Accounting, Aims or functions of Cost Accounting, Utilities of cost Accounting, Installation of Costing Systems, Criticisms on Cost Accounting

Law and Practice of Auditing

Statutory Audit, Private audit, Government audit, Internal audit, Standard Audit, Audit Note Book, Audit working Papers, Importance of Good Working Paper, ownership of Working papers, Balance Sheet Audit

Management Accounting

Comparative Statement Analysis, Comparative Balance Sheet

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Diploma Syllabus

Unit – 1:

Elements of Mechanical Engineering :

Classification of energy, steam boilers – classifications, principle of operation of impulse and reaction, gas & water turbine, Grinder Machines, Joining Process, Lubrication and Bearings Soldering, Brazing and Welding.

Engineering Machines: Introduction to engineering machines, Composition of forces, Free Body, conditions of Static equilibrium for different force systems, Lamia's Theorem, Friction, Statically determinate beams, Centroids and moment of inertia, Statically indeterminate structures, frames and trusses, projectiles, central force motion, virtual work, types of supports.

Internal Combustion Engines: Classification, I.C. Engines parts, 2/4 – Stroke Petrol and 4-stroke diesel engines. Indicated power, Brake power, indicated thermal efficiency, Brake thermal efficiency, Mechanical efficiency and specific fuel consumption.

Estimation & Costing

Strength of Material: Stress and strain, Shear stress, Bending moments and shear force diagrams, Elastic constants, Principal stress, Maximum stresses in beams, Deflection Torsion of shafts, Mohr's diagram, Column and struts, Slopes and deflection of beams, combined stress, failure theories, curved beams, Centrifugal stresses, Stresses in thin cylinders.

Unit – 2: Elements of Computer Concepts & 'C' Programming

Storage Device Concepts, Operating Systems, Networking: Storage media, Floppy drive, Hard disks, Optical media, CD-ROM, CD-R, CD-RW, DVD-ROM, Recordable DVD.

Functions of Operating Systems, Management of processor, Memory, Virtual storage devices, and information.

Networking, Convergence of computing with communications, Net working basics, Need for networking, Basic components of a network.

Fundamentals of Problem Solving, Introduction to 'C' Language: Creating and running programs, System development, Software Engineering. Introduction to 'C' Language: Background, 'C' Programs, Identifiers, Types, Variables, Constants, Input / Output, Programming example, Software Engineering, Tips and common programming errors.

Unit – 3: Electrical & Electronic Engineering

DC Machines: Working principle of DC machine as a generator and a motor, Types and constructional features, DC motor working principle, Back emf and its significance, torque equation, Types of D.C. motors, characteristics and applications.

Transformers: Principle of operation and construction of single-phase transformers

Synchronous Generators: Principle of operation. Types and constructional features. emf equation.

Three Phase Induction Motors: Concept of rotating magnetic field. Principle of operation. Types and Constructional features. Slip and its significance. Applications of squirrel - cage and slip - ring motors. Necessity of a starter, star-delta starter.

Power Electronics: Power semiconductor devices – power transistors – Thyristors – commutation techniques – controlled rectifier – choppers – inverters – AC voltage controller – electromagnetic compatibility, power supplies, primary and secondary batteries.

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