

## **ANDHRA PRADESH PUBLIC SERVICE COMMISSION::VIJAYAWADA**

### **SCHEME AND SYLLABUS FOR MAIN EXAMINATION TO THE POST OF INDUSTRIAL PROMOTION OFFICER IN A.P. INDUSTRIAL SUBORDINATE SERVICE**

<b>SCHEME FOR WRITTEN ( OBJECTIVE TYPE ) EXAMINATION</b>				
<b>PAPER</b>	<b>Subject</b>	<b>Number of Questions</b>	<b>Duration in Minutes</b>	<b>Maximum Marks</b>
<b>PAPER -I</b>	General Studies & Mental ability (Degree standard)	150	150	150
<b>PAPER -II</b>	Applied Science, Engineering and Management. (Diploma Standard)	150	150	150
<b>Total</b>				<b>300</b>
<b>N.B.1: NEGATIVE MARKS:</b> As per G.O. Ms. No.235 Finance (HR-I, Plg & Policy) Dept., Dt.06/12/2016, for each wrong answer will be penalized with 1/3 <sup>rd</sup> of the marks prescribed for the question.				

### **SYLLABUS**

#### **PAPER-I**

**150 Marks**

#### **GENERAL STUDIES AND MENTAL ABILITY**

1. Events of national and international importance.
2. Current affairs- international, national and regional.
3. General Science and it applications to the day to day life Contemporary developments in Science & Technology and information Technology.
4. Social- economic and political history of modern India with emphasis on Andhra Pradesh.
5. Indian polity and governance: constitutional issues, public policy, reforms and e-governance initiatives with specific reference to Andhra Pradesh.
6. Economic development in India since independence with emphasis on Andhra Pradesh.
7. Physical geography of Indian sub-continent and Andhra Pradesh.
8. Disaster management: vulnerability profile, prevention and mitigation strategies, Application of Remote Sensing and GIS in the assessment of Disaster.
9. Sustainable Development and Environmental Protection.
10. Logical reasoning, analytical ability and data interpretation.

11. Data Analysis:
  - a) Tabulation of data.
  - b) Visual representation of data.
  - c) Basic data analysis (Summary Statistics such as mean, median, mode, Variance and coefficient of variation) and Interpretation.
12. Bifurcation of Andhra Pradesh and its Administrative, Economic, Social, Cultural, Political, and Legal implications/problems.

**PAPER II**  
**APPLIED SCIENCE, ENGINEERING AND MANAGEMENT**  
 (DIPLOMA STANDARD) (150 Marks)

**1. MATHEMATICS**

**1. ARITHMETIC:**

- a) Number System-Natural numbers, Integers,
- b) Rational and Real numbers,
- c) Fundamental operations, addition, subtraction, multiplication, division, Square roots, Decimal fractions.
- d) Unitary method-time and distance, time and work, percentages, applications to simple and compound interest, profit and loss, ratio and proportion, variation.
- e) Elementary Number Theory – Division algorithm. Prime and composite numbers. Tests of divisibility by 2, 3,4,5,9 and 11.
- f) Multiples and factors. Factorization theorem. H.C.F. and L.C.M. Euclidean algorithm. Logarithms to base 10, laws of logarithms, use of logarithmic tables.

**2. ALGEBRA:**

- a) Basic Operations, simple factors, Remainder Theorem, H.C.F., L.C.M.
- b) Theory of polynomials, solutions of quadratic equations, relation between its roots and coefficients (Only real roots to be considered). Simultaneous linear equations in two unknowns – Analytical and Graphical solutions. Simultaneous linear inequations in two variables and their solutions.
- c) Practical problems leading to two simultaneous linear equations or inequations in two variables or quadratic equations in one variable and their solutions.
- d) Set language and set notation, rational expressions and conditional identities, laws of indices.

**3. TRIGONOMETRY:**

Sine x, Cosine x, Tangent x when  $0^\circ = x = 90^\circ$  values of sin x, cos x and tan x, for  $x = 0^\circ, 30^\circ, 45^\circ, 60^\circ$  and  $90^\circ$ . Simple trigonometric identities. Use of trigonometric tables. Simple cases of heights and distances.

**4. GEOMETRY:**

- i) Lines and angles, Plane and plane figures,
- ii) Theorems on
  - a) Properties of angles at a point,
  - b) Parallel lines,
  - c) Sides and angles of a triangle,
  - d) Congruency of triangles,
  - e) Similar triangles,
  - f) Concurrence of medians and altitudes,
  - g) Properties of angles, sides and diagonals of a parallelogram, rectangle and square,
  - h) Circles and its properties including tangents and normals,
  - i) Loci.

**5. MENSURATION:**

- a) Areas of squares, rectangles, parallelograms, triangle and circle.
- b) Areas of figures which can be split up into the figures (Field Book),
- c) Surface area and volume of cuboids, lateral surface and volume of right circular cones and cylinders, surface area and volume of spheres.

**6. STATISTICS:**

- a) Collection and tabulation of statistical data,
- b) Graphical representation frequency polygons, histograms, bar charts, pie charts etc.
- c) Measures of central tendency.

**2. PHYSICS****1. Units and Dimensions:**

Introduction, Physical quantity, Fundamental and Derived quantities, Fundamental and Derived units, SI units, Multiples and Sub multiples, Rules for writing S.I. units, Advantages of SI units. Dimensions and Dimensional formulae, Dimensional constants and Dimensionless quantities, Principle of homogeneity, Advantages and limitations of dimensional analysis, Errors in measurement, Absolute error, relative error, percentage error, significant figures, Problems.

**2. Elements of Vectors:**

Scalars and Vectors, Types of vectors (Proper Vector, Null Vector, Unit Vector, Equal, Negative Vector, Like Vectors, Co-Initial Vectors, Co-planar Vectors and Position Vector). Addition of vectors, Representation of vectors, Resolution of vectors, Parallelogram, Triangle and Polygon laws of vectors, Subtraction of vectors, Dot and Cross products of vectors-Problems.

**3. Dynamics**

Introduction-Concept of acceleration due to gravity-Equations of motion for a freely falling body and for a body thrown up vertically- Projectiles- Horizontal and Oblique projections- Expressions for maximum height, time of flight, range-Define force, momentum, angular displacement, angular velocity, angular acceleration, angular momentum, moment of inertia, torque-problems.

**4. Friction:**

Introduction to friction- Causes- Types of friction- Laws of friction- Angle of repose- Angle of friction- rough inclined plane- Advantages and disadvantages of friction- Methods of reducing friction-Problems.

**5. Work, Power and Energy:**

Work, Power and Energy- Definitions and explanation- potential energy- kinetic energy- Derivations of Potential and Kinetic energies-K.E and Momentum relation - Work-Energy theorem- Law of Conservation of energy- Problems.

**6. Simple Harmonic Motion:**

Introduction- Conditions of SHM- Definition- Examples- Expressions for displacement, velocity, acceleration, Time period, frequency and phase in SHM- Time period of a simple pendulum- Laws of simple pendulum-seconds pendulum-Problems.

**7. Heat and Thermodynamics:**

Expansion of Gases, Boyle's law, absolute scale of temperature- Charles laws- Ideal gas equation- Universal gas constant- Differences between gas constant( $r$ ) and universal gas constant( $R$ ), Isothermal and adiabatic processes, Laws of thermodynamics, Specific heats - molar specific heats of a gas -Different modes of transmission of heat ,laws of thermal conductivity, Coefficient of thermal conductivity-Problems.

**8. Sound:**

Sound- Nature of sound- Types of wave motion -musical sound and noise- Noise pollution – Causes & effects- Methods of reducing noise pollution- Beats- Doppler effect- Echo- Reverberation-Reverberation time-Sabine's formula-Conditions of good auditorium- Problems.

**9. Properties of matter**

Definition of Elasticity –Definition of stress and strain -the units and dimensional formulae for stress and strain - The Hooke's law-Definitions of Modulus of elasticity, Young's modulus( $Y$ ), Bulk modulus( $K$ ), Rigidity modulus ( $n$ ), Poisson's ratio ( $\mu$ ), relation between  $Y$ ,  $K$ ,  $n$  and  $\mu$  (equations only no derivation). Definition of surface tension- Explanation of Surface tension with reference to molecular theory - Definition of angle of contact -Definition of capillarity -The formula for surface tension based on capillarity - Explanation of concept of Viscosity - Examples for surface tension and Viscosity - Newton's formula for viscous force- Definition of co-efficient of viscosity- The effect of temperature on viscosity of liquids and gases - Poiseuille's equation for Co-efficient of viscosity- The related numerical problems.

**10. Electricity & Magnetism:**

Ohm's law and explanation, Specific resistance, Kirchhoff's laws, Wheatstone's bridge, Meter bridge, Coulomb's inverse square law, magnetic field, magnetic lines of force, magnetic induction field strength- magnetic induction field strength at a point on the axial line - magnetic induction field strength at a point on the equatorial line-problems.

## 11. Modern Physics;

Photoelectric effect –Einstein's photoelectric equation-laws of photoelectric effect-photoelectric cell–Applications of photo electric effect- Total internal reflection-fiber optics- -principle and working of an optical fiber-types of optical fibers - Applications of optical fibers- superconductivity–applications-Nanotechnology definition, nanomaterials, applications.

## 3. CHEMISTRY

### 1. Fundamentals of Chemistry

**Atomic Structure:** Introduction - Fundamental particles – Bohr's theory – Quantum numbers –Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configurations of elements

**Chemical Bonding:** Introduction – types of chemical bonds – Ionic and covalent bond with examples–Properties of Ionic and Covalent compounds- structures of ionic crystals (NaCl and CsCl).

### 2. Solutions

Introduction of concentration methods – mole concept, molarity and normality – Numerical problems on mole, molarity and normality.

### 3. Acids and Bases

Introduction – Theories of acids and bases and limitations – Arrhenius theory- Bronsted – Lowry theory – Lewis acid base theory – Ionic product of water- pH related numerical problems–Buffer solutions, action of buffer and its applications.

### 4. Principles of Metallurgy

Characteristics of Metals and non-metals –Distinguish between Metals and Non-metals, Define the terms i) Metallurgy ii) ore iii) Gangue iv) flux v) Slag - Concentration of Ore – Hand picking, Levigation, Froth floatation – Methods of Extraction of crude Metal – Roasting, Calcination, Smelting – Alloys – Composition and uses of brass, German silver and Nichrome.

### 5. Electrochemistry

Conductors, semiconductors, insulators, electrolytes and non-electrolytes – electrolysis – Faraday's laws of electrolysis- application of electrolysis (electroplating) -numerical problems on Faraday's laws – Galvanic cell – standard electrode potential – electrochemical series– emf and numerical problems on emf of a cell .

### 6. Corrosion

Introduction - factors influencing corrosion - composition, stress and concentration cells– rusting of iron and its mechanism – prevention of corrosion by coating methods, cathodic protection methods.

**7. Water technology**

Introduction–soft and hard water–causes of hardness–types of hardness–disadvantages of hard water – degree of hardness (ppm and mg/lit) – softening methods – permutit process – ion exchange process– qualities of drinking water – Chemistry involved in treatment of water (Coagulation, Chlorination, defluoridation ) - Osmosis, Reverse Osmosis–Applications of Reverse osmosis.

**8. Polymers**

Introduction – polymerization – types of polymerization – addition, condensation with examples – plastics – types of plastics – advantages of plastics over traditional materials- Disadvantages of using plastics – Preparation and uses of the following plastics i) PVC ii) Teflon iii) Polystyrene iv) Nylonn 6,6 – Processing of natural rubber - Vulcanization – Elastomers- Preparation and applications of Buna-s, Neoprene rubbers.

**9. Fuels**

Definition and classification of fuels–characteristics of good fuel-composition and uses of gaseous fuels.

**10. Chemistry in daily life**

Basic composition, applications, health aspects and pollution impacts of soaps and detergents, vinegar, insect repellents, soft drinks, activated charcoal.

**11. Environmental studies**

Introduction– environment –scope and importance of environmental studies – important terms related to environment– renewable and non-renewable energy sources–Concept of ecosystem – Biotic components –Forest resources – Deforestation -Biodiversity and its threats-Air pollution – causes-effects–Global environmental issues – control measures – Water pollution – causes – effects – control measures.

**4.INDUSTRIAL MANAGEMENT****1. Basics of Industrial Management**

Introduction: Industry, Commerce and Trade; Definition of management; Functions of management; Principles of scientific management: – F.W.Taylor, Principles of Management: Henry Fayol; Administration organisation and management; Nature of management; levels of management; managerial skills;

**2. Organisation Structure & Organisational Behaviour**

Organizing - Process of Organizing; Line, Staff and line & staff Organizations, Communication, Motivational Theories; Leadership Models; Decision making, Human resources development; Forms of Business ownerships: Types – Sole proprietorship, Partnership, Joint Stock Companies, Cooperative types of Organizations, Corporations, Boards.

### 3. Production Management

Definition and importance; Plant location and layout; Types of production -job, batch and mass; production Planning and Control: relation of production department with other departments, routing, scheduling, dispatching and follow up; Break even analysis; Application of CPM and PERT techniques; simple numerical problems;

### 4. Materials Management

Materials in industry, Basic inventory control model, ABC Analysis, Safety stock, re-order level, Economic ordering quantity, Stores Management: Stores layout, stores equipment, Stores records, purchasing procedures, e-tendering, e-procurement; purchase records, Bin card, Cardex system.

### 5. Maintenance Management & Industrial Safety

Objectives and importance of plant maintenance, Different types of maintenance, Nature of maintenance problems, Range of maintenance activities, Schedules of preventive maintenance, Advantages of preventive maintenance, 5 S principles; Importance of Safety at work places; Causes of accidents-cost of accidents-prevention- industrial hazards

### 6. Entrepreneurship Development

Definition of Entrepreneur; Role of Entrepreneur; Concept of Make In India, ZERO defect, Zero Effect, Concept of Start-up Company, Entrepreneurial Development: Role of SSI, MSME, DICs, Entrepreneurial development schemes; Institutional support, financial assistance programmes; Self- employment schemes, Market survey and Demand survey; Preparation of Feasibility study reports

### 7. New Trends in Management

Introduction to Management Information System (MIS); RFID application in materials management; Total Quality Management (TQM)- Concept of quality discussed by B. Crosby W. Edward, Deming, Joseph M. Juran, Kooru Ishikawa, Genichi Taguchi, Shigco Shingo. Quality systems –Definitions of the terms used in quality systems like, quality policy, quality management, quality systems, Stages of development of ISO9000 series, ISO-14000.

## **5. INDUSTRIAL ENGINEERING**

### 1. Work Study

**Industrial Engineering:** Definition of Production and productivity;

**Work Study:** Definition, objectives and scope of work study.

**Method Study:** Definition, objectives, procedure of conducting method study –

Process chart symbols – Explanation with Operation process chart, Flow process chart and two handed process charts only - Uses of flow diagram and string diagram.

**Micro-motion study:** Therbligs used in the micro-motion study - SIMO chart – Chrono cyclegraph.

**Work Measurement or Time study:** Definition, objectives - Work measurement techniques.

**Time Study:** Procedure by using a stop watch to measure the standard time.

**Constituents of standard time:** Normal time- rating factor- allowances – Simple Problems. Standard data - Determination of standard time by using Predetermined Motion Time Standards (PMTS) - Determination of standard time by using work sampling.

**Wage and incentive plans:** Definitions of wage, nominal wage, real wage, living wage, minimum wage, fair wage and incentive- List different incentive plans - Solve simple problems on Halsey, Rowan and Emerson efficiency plans only.

## 2. Statistical Quality Control (SQC):

The Meaning of Quality - objectives of inspection - methods of inspection – floor or patrolling inspection - centralized inspection – trial run inspection- first piece inspection - pilot piece inspection - sample inspection – merits and demerits of the above -

**Statistical Quality Control:** Definition - Chance and assignable causes – Quality control tools –Types of statistical data – variables and attributes data – Normal distribution curve; Control Charts for variables data- Construction of Control Charts for X-Bar and R- Charts. Interpretation of control charts to know whether the process is out of control or in control - Simple Numerical Problems.

**Control charts for attributes data:** Fraction defective (p), percent defective (100p), Number of Defectives (np) charts - Simple Numerical Problems. Acceptance sampling plan – advantages and disadvantages of sampling plan over 100% inspection – Single sampling plan for accepting a lot with a flow chart – Principles of random sampling; Six sigma: Importance – Objectives – advantages.

## 6.FUNDAMENTALS OF COMPUTER SCIENCE

### UNIT I:

**A Simple Computer System:** Central processing unit, the further need of secondary storage, Types of memory, Hardware, Software and people.

**Peripheral Devices:** Input, Output and storage, Data Preparation, Factors affecting input, Input devices, Output devices, Secondary devices, Communication between the CPU and Input/ Output devices.

**About Virus:** Virus, Types of Virus, How Does Virus Affect, Impact of Virus, Virus Detection, Virus Preventive Measures, List of most popular and effective antivirus.

### UNIT II:

**Problem Solving and Programming:** Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, the one-zero game, some structured programming concepts, documents.



**Programming Languages:** Machine Language and assembly language, high -level and low level languages, Assemblers, Compilers, and Interpreters.

**Computer Systems and Development:** Investigation, Analysis, Design, system processing and general program design, Presentation to management and users, Implementation, Documents.

### **UNIT III:**

**Computer Networks:** Introduction to computer Networks, Network topologies-Bus topology, star topology, Ring topology, Mesh topology, Hybrid topology,

**Types of Networks:** Local area Network, Wide Area Networks, Metropolitan Networks, Campus/ Corporate Area Network, Personal Area Network, Network Devices- Hub, Repeater, Switch, Bridge, Router, Gateway, Network interface Card.

**Wireless Networks:** Types of wireless networks, security in wireless Networks, Limitations of wireless Networks, Bluetooth – Bluetooth Piconets, Avoiding Interference in Bluetooth Devices, Differences between Bluetooth and Wireless Networks.

### **UNIT IV:**

**Operating systems:** Introduction, Evolution of operating systems, Process Management- Process control block, Process operations, Process scheduling, Command Interpreter, Popular operating systems-Microsoft DOS, Microsoft Windows, UNIX and Linux.

**Internet Applications:** Internet as a global network, Search Engine, Online education, Internet utilities – email, online banking, reservations etc.

### **UNIT V:**

**Database Systems:** File-Oriented Approach, Database-oriented Approach-Components of Database system, Advantages & Disadvantages of Database approach, Applications of Database systems, Database views, Three-schema architecture, Database models-Hierarchical model, Network Model, relational Model, Object-oriented Data Model, Components of database management systems, Retrieving Data through Queries.

**E-Governance:** What is e-Governance, Concept of e-Governance, Benefits of E-governance.

**E-Commerce:** What is e commerce, the scope of E commerce, Benefits and limitations of E- Commerce.

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