SCHEME AND SYLLABUS FOR RECRUITMENT TO THE POST OF INSPECTOR OF FACTORIES IN A.P. FACTORY SERVICE
(Degree Standard)

SCHEME

PART – A: WRITTEN (Objective Type) EXAMINATION

<table>
<thead>
<tr>
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<th>Subject</th>
<th>Marks</th>
<th>Questions</th>
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<tbody>
<tr>
<td>i)</td>
<td>General Studies and Mental ability</td>
<td>150</td>
<td>150</td>
<td>150</td>
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<tr>
<td>ii)</td>
<td>Subject: MECH or ELE or CHEM or INDUSTRIAL ENGINEERING</td>
<td>300</td>
<td>150</td>
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PART – B: INTERVIEW (ORAL TEST) 50 Marks

SYLLABUS

GENERAL STUDIES AND MENTAL ABILITY

1. General Science – Contemporary developments in Science and Technology and their implications including matters of every day observation and experience, as may be expected of a well-educated person who has not made a special study of any scientific discipline.

2. Current events of national and international importance.

3. History of India – emphasis will be on broad general understanding of the subject in its social, economic, cultural and political aspects with a focus on AP Indian National Movement.

4. World Geography and Geography of India with a focus on AP.

5. Indian polity and Economy – including the country’s political system- rural development – Planning and economic reforms in India.

MECHANICAL ENGINEERING

1. **Theory of Machines:** Kinematic and dynamic analysis of planar mechanisms, Cams, Gears and gear trains, Flywheels, Governors, Balancing of rigid rotors, Balancing of single and multi cylinder engines, Linear vibration analysis of mechanical systems (single degree and two degrees of freedom), Critical speeds and whirling of shafts, Automatic Controls, belts and chain drives. Hydrodynamic bearings.


4. **Manufacturing Science:** Merchant’s force analysis, Taylor’s tool life equation, machine ability and machining economics, Rigid, small and flexible automation, NC, CNC. Recent machining methods-EDM, ECM and ultra sonic, Application of lasers and plasmas, analysis of forming processes. High energy rate forming, Jigs, fixtures, tools and gauges, inspection of length, position, profile and surface finish.

5. **Manufacturing Management:** Production Planning and Control, Forecasting-Moving average, exponential smoothing. Operations sheduling; assembly line balancing. Product development Breakeven analysis, Capacity planning. PERT and CPM.


7. **THERMODYNAMICS:** Basic Concept. Open and closed systems, Applications of thermo-dynamic Laws, Gas equations, Clapeyron equation, Availability, Irreversibility and Tds relations.

8. **I.C. Engines, Fuels and Combustion:** Spark ignition and compression ignition engines, Four stroke engine and Two stroke engines, mechanical, thermal and volumetric efficiency, Heat balance.


10. **Turbo-Machines and Power Plants:** Continuity, momentum and Energy Equations, Adiabatic and isentropic flow, fanno lines, Rayleigh lines. Theory and design of axial flow turbines and compressors Flow through turbo-machine blade, cascades, and centrifugal compressor. Dimensional analysis and modeling. Selection of site for steam, hydro, nuclear and stand-by power plants, Selection base and peak load power plants, Modern High pressure, High duty boilers, Draft and dust removal equipment, Fuel and cooling water systems, heat balance, station and plant heat rates, operation and maintenance of various power plants, preventive maintenance, economics of power generation.
Electrical Engineering

Circuits, Instruments and Machines:
4. Transformers: Principles of operation – constructional details of single and polyphase transformers – core, tank and other auxiliaries – operation on no load and load – phasor diagram – regulation and efficiency – All-day efficiency 3 Phase to two phase conversion – Choice of insulation – testing of transformers as per I.S.I.

Power generation, transmission, distribution and utilisation:
5. Fault calculations and reactors: Per unit system – Choice of base values symmetrical components and application to symmetrical and unsymmetrical faults – reactors and their methods of usage – testing of reactors.
CHEMICAL ENGINEERING


(g) Material and Energy balances : Material and energy balance calculations in processes with recycle/bypass/purge. Combustion of solid/liquid/gaseous fuels, stoichiometric relationships and excess air requirements. Adiabatic flame temperature.


INDUSTRIAL ENGINEERING

1. Theory of Machines:
Kinematic and dynamic analysis of planar mechanisms, Gams, Gears and gear trains, Flywheels, Governors, Balancing of rigid motors, Balancing of single and multi cylinder engines, Linear vibration analysis of mechanical systems (single degree and two degrees of freedom), Critical speeds and whirling of shafts, Automatic Controls, Belts and chain drives. Hydrodynamic bearings.

2. Mechanics of Solids
Stress and strain in two dimensions. Principal stresses and strains, Mohr’s construction, linear elastic materials, isotropy and an isotropy, Stress-strain relations, unilaxial loading, thermal stresses. Beams: bending moment and shear force diagrams, bending stresses and deflection of beams, shear stress distribution. Torsion of shafts, helical springs. Combined stresses, Thick and thin walled pressure vessels. Struts and columns, strain energy concepts and theories of failure. Rotating discs, Shrink fits,

3. Engineering Materials
Basic concepts on structure of solids, Crystalline materials, Defects in crystalline materials, Alloys and binary phase diagrams, structure and properties of common engineering materials, Heat treatment of steels, Plastics, Ceramics and composite Materials, common applications of various materials.

4. Manufacturing Science
Merchant’s force analysis, Taylor’s tool life equation, machine ability and machining economics, Rigid small and flexible automation, NC, CNC, Recent machining methods – EDM, ECM and ultra sonics. Application of lasers and plasmas, analysis of forming processes. High-energy rate forming jigs, fixtures, tools and gauges, inspection of length, position, profile and surface finish.

5. METROLOGY AND INSTRUMENTATION


Taylor’s principle for plain limit gauges. Use of plug, Ring and Snap gauges. Indicating type limit gauges. Gauge material and step in gauge manufacture. General geometric tests for testing machine tools.

Elements of instrumentation system. Static and dynamic characteristics. Dynamic response of first order and second order instruments. Types of error. Displacement transducers LVDT.

6. Production Management:
Production planning and control, Forecasting Moving average, exponential smoothing, Operations scheduling; assembly line balancing. Product development Breakeven analysis, Capacity planning PERT and CPM.

7. Operations Research:
Linear programming – graphical method, Simplex, Revised Simplex and Dual Simplex methods. Duality and economic interpretation of dual variables.


Dynamic programming – capital budgeting problem. Game theory. Waiting lines – single server and multiple server models based on Poisson’s arrivals.
8. **Material Management**: Role of material planning. EOQ inventory, control (deterministic and probabilistic models) MRP – 1 (Inputs& Outputs) MRP-2 Material handling equipment (Selection, Classification, types) ABC analysis. Industrial Robots.

9. **Work Study**: Procedure of method study, various charts used in method study principals of motion of economy. Work place design, ergonomics.

   **Time Study**: Calculation of standard time. Performance rating types of ratings, work sampling, types of incentive financial and non-financial. Different wage payment plans.


   **Costing**: Elements of costs. Types over heads and overhead distribution. Break even analysis and its calculation. Description and its methods.

11. **Plant maintenance (objective importance)**. Types of maintenance (break down, preventive, scheduled, predictive) plant maintenance schedule. Recent development in plant maintenance techniques, conditioning monitoring.

   Replacement analysis (Reasons and factors considered for equipment replacement) methods like MAPI.


   Sd- Secretary,
   13/05/2008