COURSE SYLLABUS FOR MECHANIC CUM ELECTRICIAN

(A) ELECTRICAL ENGINEERING:

1. ELECTRICAL MACHINES:

Energy Conversion Principles, D.C. Generator, D.C. Motor, Single Phase Transformer, Poly Phase Transformer , Poly – Phase Induction Motor, Single Phase Induction Motor, Alternator, Synchronous Motor, A.C. Commutator Motor.

2 GENERATION AND TRANSMISSION OF ELECTRICAL POWER

Generation of Electrical Power, Transmission of Electrical Power, Control of Power Station, H.V.D.C. Transmission, Non-conventional Power Generation

3. A. C. DISTRIBUTION AND UTILISATION

A.C Distribution, Substation, Cables, PF Improvement and Tariff, Industrial Drives, Illumination: Heating, Welding and Electrochemical Processes.

4. ELECTRICAL INSTRUMENTATION

Fundamentals of Measurements: Potentiometers & Bridges: Electromechanical Instruments: Electronic Instruments: Calibrations & Testing: Transducers: Instrumentation System: Data Handling And Telemetering:

5. FUNDAMENTALS OF ELECTRONIC CIRCUIT

Single Phase Rectifier: Regulated Power Supply (RPS): Voltage Amplifier: Power Amplifier: Oscillators: Electronic Test Instruments: Simple Circuits Using IC.

6 ENERGY CONSERVATION TECHNIQUES.

Elements of Energy Conservation and Management, Energy Conservation Approaches In Industry, Technology & Economic Evaluation of Energy Conservation Energy Conservation in Power Generation, Transmission and Distribution; Energy Audit: Electrical Installation and Maintenance, Commissioning and Testing, Installation; Maintenance of Electrical Machine/Equipment: Earthing: Electrical Accidents and Safety: Electrical Wiring, Estimation, Costing and Contracting, Electrical Wiring: Elements of Estimating, Estimating and Costing of Domestic and Industrial Wiring, Estimation of Overhead and Underground Distribution System, Estimating and Costing of Electrical Product, Estimating and Costing of Repairs and Maintenance of Electrical Devices and Equipment, Principles of Contracting

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(B) MECHANICAL ENGINEERING:

1. **MATERIALS TECHNOLOGY**: Introduction and Properties of Engineering Material, Metallurgical Consideration of Metals, Ferrous Metals and its Alloys, Non Ferrous Metals and Its Alloys, Non Metallic and Composite Materials, Heat Treatment, Selection and Specification of Materials, Non-Destructive Testing, Powder Metallurgy, Surface Coatings,

2. **STRENGTH OF MATERIALS**: Direct Stress and Strain, Shear Force (SF) and Bending Moment (BM), Stresses in Beams, Deflections of Beams, Combined Direct and Bending Stresses , Columns and Struts, Torsion and Springs, Principal planes and principal stresses, Riveted and Welded Connections, Study of Materials

3. **THERMAL ENGINEERING**: Boilers, Steam prime movers, steam condensors & cooling towers, Air compressors, Internal Combustion (IC) Engines, Eco-friendly Fuels, Gas turbines, Refrigeration and air conditioning , Heat transfer.

4. **TOOL ENGINEERING**: Introduction, process planning, Economy and estimation in tool engineering, Introduction to tool design, cutting tool selection, design of jigs & fixtures, Design of press tools, Design of limited gauges.

5. **DESIGN OF MACHINE ELEMENTS**: Introduction , Design of machine elements subject to direct stresses, Design of machine elements subject to bending, Design of machine elements subject to direct twisting moments, Design machine elements subject to bending stresses, pressure vessels, selection procedure for bearings,

6. **ESTIMATING COSTING AND CONTRACTING (ECC)**: Introduction, elements of cost and overhead allocation, cost estimation of welding, cost estimation of forging, casting, machine and press tools, breakeven analysis, problems and solution of cost, budgeting and industrial accounting, contracting.

7. **CAD-CAM** : Introduction, handware and software in CAD system, modeling, computer aided manufacturing, CNC part programming, recent trends in CAD/CAM

8. **MANUFACTURING ENGINEERING**: Fundaments of metal removal process, Kinematics & Machines, Basic machine tools, capstan and turret lathe, cutting tools, process and press tools.

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9. **METROLOGY & INSTRUMENTATION**: Introduction, linear measurement, angular measurement, testing of straightness, fltness and squareness, assessment of surface roughness, screw thread measurement, Gear measurement, limit gauges, sensors & transducers, temperature measurement, pressure measurement, flow measurement, automation control, calibrations of instruments.

10. **PLANT MACHINERY & SAFETY**: Introduction to maintenance engineering, tribology, corrosion and prevention, recovery methods for equipment maintenance, planning and scheduling of maintenance activities, maintenance, breakdown maintenance, prevention maintenance, Industry safety, condition monitoring recording and retrofitting of machine tools, Installation and testing of Industrial equipments.

11. **THEORY OF MACHINE**: Introduction, velocity and acceleration diagrams, Cams and Cam profiles, friction, power transmission, flywheel and governor balance & Vibration.

12. **FLUID MECHNAICS & HYDRAULIC MACHINES**: Fluid and fluid properties, fluid statics, fluid kinematics, fluid dynamics, flow measurements, flow through pipes, impact of jets, hydraulic prime movers, pumps- hydraulic devices, pneumatic devices.

Note: Equal weightage to Part A & B will be given

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