NSQF LEVEL-4 SYLLABUS

Trade-ELECTRICIAN

ITI 2nd Year

Syllabus

1-General concept of rotating electrical machines.

Principle of DC generator. Use of Armature, Field Coil, Polarity, Yoke, Cooling Fan, Commutator, slip ring and Brushes, Laminated core etc. E.M.F. equation ,separately excited and self-excited generators.

Series, shunt and compound generators. Armature reaction, Commutation, inter poles and connection of inter poles. Parallel Operation of DC Generators. Load characteristics of DC generators. Application, losses & efficiency of DC Generators. Routine & maintenance

2-Principle and types of DC motor. Relation between applied voltage back e.m.f., armature voltage drop, speed and flux of DC motor. DC motor Starters, relation between torque, flux and armature current. Changing the direction of rotation. Characteristics, Losses & Efficiency of DC motors. Routine and maintenance. Methods of speed control of DC motors.

3-Lap and wave winding and related terms.

4-Working principle of three phase induction motor. Squirrel Cage Induction motor, Slip-ring induction motor; construction, characteristics, Slip and Torque. Different types of starters for three phase induction motors, its necessity, basic contactor circuit, parts and their functions.

5-Single phasing prevention. No load test and blocked rotor test of induction motor. Losses & efficiency. Various methods of speed control. Braking system of motor. Maintenance and repair. Concentric/ distributed, single/ double layer winding and related terms.

6-Working principle, different method of starting and running of various single-phase AC motors.

Domestic and industrial applications of different single-phase AC motors. Characteristics, losses and efficiency. Concentric/ distributed, single/ double layer winding and related terms. Troubleshooting of single-phase AC induction motors and universal motor.

7-Principle of alternator, e.m.f. equation, relation between poles, speed and frequency. Types and construction. Efficiency, characteristics, regulation, phase sequence and parallel operation. Effect of changing the field excitation and power factor correction.

8-Working principle of synchronous motor. Effect of change of excitation and load. V and anti V curve.

Power factor improvement , Rotary Converter, MG Set description and Maintenance.

9-Resistors – colour code, types and characteristics. Active and passive components. Atomic structure and semiconductor theory.

10-P-N junction, classification, specifications, biasing and characteristics of diodes. Rectifier circuit - half wave, full wave, bridge rectifiers and filters. Principle of operation, types, characteristics and various configuration of transistor. Application of transistor as a switch, voltage regulator and amplifier.

11-Basic concept of power electronics devices. IC voltage regulators Digital Electronics - Binary numbers, logic gates and combinational circuits.

12-Working principle and uses of oscilloscope. Construction and working of SCR, DIAC, TRIAC and IGBT.

13- Study and understand Layout drawing of control cabinet power and control circuits. Various control elements: Isolators, pushbuttons, switches, indicators, MCB, fuses, relays, timers and limit switches etc.

14-Wiring accessories: Race ways/ cable channel, DIN rail, terminal connectors, thimbles, lugs, ferrules, cable binding strap, buttons, cable ties, sleeves, gromats and clips etc. Testing of various control elements and circuits.

15-Working, parameters and applications of AC / DC drive. Speed control of 3 phase induction motor by using VVVF/AC Drive.

16- Basic concept, block diagram and working of voltage stabilizer, battery charger, emergency light, inverter and UPS. Preventive and breakdown maintenance.

17-Conventional and non-conventional sources of energy and their comparison. Power generation by thermal and hydel power plants. Various ways of electrical power generation by non-conventional methods.

Power generation by solar and wind energy. Principle and operation of solar panel.

18-Transmission and distribution networks. Line insulators, overhead poles and method of joining aluminum conductors. Safety precautions and IE rules pertaining to domestic service connections. Various substations.

Various terms like – maximum demand, average demand, load factor, diversity factor, plant utility factor etc.
19-Types of relays and its operation. Types of circuit breakers, their applications and functioning. Production of arc and quenching. EV scenario in India and EV Charging basic theory. EV Charging safety requirements.

Engineering Drawing Electrician 2nd Year Syllabus

1-Reading of Electrical Sign and Symbols. Sketches of Electrical components.
2-Reading of Electrical wiring diagram and Layout diagram. Reading of Electrical earthing diagram.
3-Drawing the schematic diagram of plate and pipe earthing. Drawing of Electrical circuit diagram.
4-Drawing of Block diagram of Instruments & equipment of trades

Workshop Calculation and Science Electrician 2nd Year

Friction Friction - Lubrication
Algebra Algebra - Addition , subtraction, multiplication & division Algebra - Theory of indices, algebraic formula, related problems
Elasticity -Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus
Profit and Loss -Profit and loss - Simple problems on profit & loss Profit and loss - Simple and compound interest
Estimation and Costing -Estimation and costing - Simple estimation of the requirement of material etc., as applicable to the trade. Estimation and costing - Problems on estimation and costing