Electrician Licensing Examination

Category 2

Syllabus and Study Guide

Section 1 (40 multiple choice questions)

1. Electrical Codes/Standards (NEC NFPA 70/JS21)
2. Electrical Safety
3. Laws & Regulations

Section 2 (20 multiple choice questions)

4. Basic Electrical Theory
5. Motors & Transformers

Study Guide

1. Electrical Codes/Standards (NEC NFPA 70/JS21)

- Electrical codes
- What the Electrical Installation provides. The necessity for regulations; safety of life and property.
- Supply Systems, Standard Voltage: Variation of voltage and frequency. Distribution systems shown in diagrammatic form. Three phase four wire delta.
- Distribution of supply in buildings. Regulations for control, distribution and excess current protection.
- Frequency and voltage standards for residential distributions
- The general layout of lighting and heating circuits. Planning of final sub-circuit.
- General application of Diversity Factor. Two-way and intermediate switching.
- Conductors and Cables: Types of cables used in installation work. Current-carrying capacity of cable. Regulations Heating and Voltage Drop

- Joints and jointing. Flexible Cords. Connections for Flexible cords.
- Wiring Systems. Screwed Conduit; Load-sheathed wiring system; P.V.C cable; M.I.C.C. Duct System; Wiring Accessories: Switches, plugs, socket outlets.
- Earthing: Principle governing the Earthing of the metal portions of electrical installations with special reference to the safety of person and property. Construction, application and installation of earth leakage circuit-breaker. Causes and prevention of corrosion.
- Test for insulation at various stages, continuity and polarity of current-carrying conductors and for continuity of earth continuity conductors. Tracing out circuits. Testing for location and remedying of faults. Testing for and diagnosis of fault in electrical machines and switch gear.
- Installation of electric signs.
- Lightning rods installation and protection
- Use of AFCI receptacles
- Duplet plug outlet, MEM plug outlet and GFCI plug outlet
- Wire standards
- Regulations for electricity connections to residential premises

2. Electrical Safety

- General safety
- Electrical shock and treatment
- Electrical hazards
- Grounding and GFCI
- Wiring and protection
- Equipment

3. Laws & Regulations

- As outlined in the JM-Jamaica-Electric-Utility-Sector-Book-of-Codes
- As outlined in the New Electricity Regulations 212-254 (Combined)

4. Basic Electrical Theory

- Basic circuit laws
- Current, voltage and power

- Circuit components and their dc and ac circuits: resistors, Inductors and capacitors
- The heating, magnetic and chemical effects of the electrical current. Examples of the applications of these effects (AC and DC).
- Conductors and Insulators: Concepts of Resistance. Potential difference as the cause of current flow. Ohm's Law with simple exercises. Units.
- Series and parallel circuits. The dependence of Resistance on Dimensions; Restivity. The effect of temperature on the resistance of conductors and insulators. Exercises.
- Volt, ampere and watt. Rating of lamps and heating elements. Exercises. Relationship between watt and horsepower and between the KWH and B.T.U. Heating effect of current.
- Magnetic fields produced by current-carrying conductors. Magnetic materials. Magnetization of iron. Hysteresis. Electromagnetic Induction. Idea of Inductance.
- Direct-current Motors. Principle of operation. Construction; Torque; Reversal of Rotation. Characteristics of shunt, series and compound motors. Speed control; Motor starters. Efficiencies of D.C. Machines. (Descriptive treatment only)
- D.C. DISTRIBUTION. Two-wire and three-wire systems.
- Electric Statics. Idea of Capacitors.
- Alternating current; R.M.S. values. Complexor representation of voltage and current. Phase difference. The effect of inductance and capacitance in A.C. circuit. Power factor and PF; co-reaction; KW, KVA and KVAR. Simple calculation on A.C. circuits.
- A.C. measuring instruments. Ammeter including clip-on type. Voltmeter, Wattmeter and KW Hour meter.
- Mutual inductance and applications
- A.C. transmission and distribution; Advantage of A.C. vs D.C.; Voltage-drop A.C. transmission lines; Three-phase four wire distribution system.
- Cable size calculations for PVC insulated circuits
- Determination of electrical parameters for domestic electrical installation
- Equipment power and energy consumption

5. Motors & Transformers (three phase)

- The general idea of three-phase alternating e.m.f. The 'Edison' system. Danger of open-circuited neutral.

- Simple construction and explanation of the operation of: Three-phase induction motor, single-phase motor and three-phase synchronous motor.
- Simple construction and explanation of the theory and operation of the transformer.
- Delta and Wye networks
- Simple description of the methods of converting alternating current to direct current. (Motor generator, thermionic rectifiers and semi-conductor rectifiers).
- Losses in motors and transformers.

End