A COURSE OUTLINE

IN

CRAFT CERTIFICATE ELECTRICAL INSTALLATION

P.T.I. (1041, 1042, 4043)

FOR THE

TECHNICAL INSTITUTE

IN

GUYANA

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Assessment

Theory 60%

Practical 40%

Texts

I. Calculations and Science Vol 1 and 2 by A.J. Watkins.
II. I,E.E. Regulations.
III. Basic Electrical principles by H.A. Miller.
IV. Electrical Installation practice Part 1, 11 and 111 by H. A Miller.
V. Electrical Installation Technology by F.G. Thompson.
VI. Electrical Installation Work T.C. Francis.
VII. Principles of Electricity by Hughes and Morley.
VIII. Electrical Wiring of Buildings By Neidle.
IX. Electrical Installation Technology by Neidle.

Explain Electrical Theory

I. Describe atomic structure.
II. Define Ionisation.
III. Explain nature of conductors and insulators.
IV. Demonstrate Construction of Atom by use of Flip Chart.

Analyse electrical Circuits

I. Identify circuit components.
II. Establish series, parallel and series, parallel circuits.
III. Calculate total resistance of series, parallel and series parallel circuits.
IV. Interpret ohm's law
V. Apply ohm's laws, to find voltage, current and resistance of series, parallel and series parallel circuit.
VI. Define units of voltage, current and resistance, power work and energy.
VII. Energy identify types of final Sub-Circuits.

Identify Sources of E.M.F.

I. Distinguish between chemical, heating, solar, mechanical, static E.M.F.
II. Construct a simple cell using sources stated in 1.

Recognise Effects of Electric Current

I. Describe chemical, magnetic and heating effects of Electric current.
II. Demonstrate the chemical, magnetic and heating effects of E.C.
III. Practical application of (1).

Explain Resistance

I. List factors governing resistance.
II. Demonstrate resistance value as to P, L and A.
III. Recognise the shapes of magnets.
IV. Plot the field of various types of magnets (bar, hors, shoe etc.).
V. Produce a magnet by induction.
VI. State the laws of magnetism.
VII. Apply the principles of magnetic screening.
VIII. Explain the storage of magnets.
IX. Explain magnetic Saturation.

Describe Electrical Magnetism

I. Describe the production of electro magnetic fields:- single loop solenoid.
II. Explain self and mutual inductance.
III. Construct a simple e.g. relays, bells, buzzers, indicators, loud speakers, telephone etc.
IV. State the rules governing the flow of current.
V. State Lent's and Friday's laws, Fleming and right and left hand rule.
VI. Solve problems using relevant formula e.g. H=NI; F=NI; E=BLV; F=BLI etc. L

Discuss about transformer

I. Explain the construction of a transformer.
II. Describe the principles of operation.
III. List the various part.
IV. Sketch the types of transformers.
V. Calculate the various of voltage, current, turn ration using transformer.
Formula $\frac{NI}{N2} = \frac{VI}{V2} = \frac{I2}{I1}$
VI. List the methods of cooling.
VII. Explain the centre – tapped transformer, auto-transformer.
VIII. Discuss the application of current and voltage transformers.
IX. Identify faults in transformer.

Explain Overloads and Short Circuits

I. List causes of overload and short circuits.
II. Describe the effects of overload and short circuit.
III. Identify means of protection.
IV. State advantages and disadvantages.
V. Differentiate close and coarse excess current protection.

Explain Electrostatics

I. Construct capacitors
II. Describe types of capacitors
III. Relate characteristics of capacitors.
IV. Solve problem on capacitors.

Explain A.C. Generation

I. Produce A.C. sine wave.
II. Describe A.C. Generator Construction
III. List Factors affecting A.C. generation
IV. State terms associated with A.C. sine wave, 1ims value, average and valueeter.
V. Define A.C. power
VI. Describe electricity supply system, power stations. Bulk supply and distribution, control centres and transmission.
VII. Determine phase relationship between voltage and current.

Explain D.C. Generation

I. Describe construction of D.C. generators.
II. Illustrate rectification
III. Discuss back E.M.F. Lene's Law
IV. Calculate generated E.M.F and armature current.
V. Explain the function of a commutator as a rectifier

Discuss about Circuits

I. Illustrate types of lighting circuits.
II. Describe methods of control of various types of circuits single one way and single pole two way.
III. Illustrate types of power circuits.
IV. Identify faults in circuits.
V. Outline the tests to be carried out.
VI. Describe types of lighting fixtures – discharge lamps, neon signs, filament lamps.

Describe Motors and Control Gear (Single Phase)

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Describe Motors and Controls Gear (Single Phase)

I. Name types of A.C. and D.C. motors.
II. Describe construction of various motors.
III. Demonstrate applications of motors.
IV. Show the use of the control gear for starting.
V. List trouble shooting procedure and repairs required.
VI. List types of rotor.
VII. List types of overload.

Discuss R.L.C Circuits in Series

I. Compass relationship between voltage and current in R.L.C. circuits.
II. Calculate inductive reactance, capacitive reactance and impedance in R.L.C. circuits.
III. Distinguish apparent, active and reactive power.
IV. Illustrate relevant phasor diagram to find various values.
V. Discuss power factor.
VI. Discuss methods of power factor correction.

Describe Earthing

I. State requirements for earthing
II. Show earth-faults loop path.
III. Measure impedance of earth path
IV. List the types of earthing systems
V. List troubles shooting and repairs procedures.
VI. List and explain terms associated with earthing e.g lead, electrode etc.

Introduce Basic Electronics

I. List types of registers and uses.
II. Describe types of resistors.
III. Use colour coding.
IV. Describe thermionic emission
V. Describe semi conductor theory
VI. Describe conductor theory.
VII. Explain the formation of P.N. Junction.
VIII. Describe uses of diode as rectifier.
IX. Explain rectification.
X. List types of transistors.
XI. State uses of transistors

Describe Electrical Measuring Instrument

I. List types of measurement instruments e.g. moving oil, moving iron, dynometer, galvanometer.
II. List use of measuring instruments.
III. Describe each measuring instrument.
IV. List precautions when handling instruments.
V. Explain factors affecting instruments.
VI. Use of installation resistance tester.

State Safety Precautions.

I. Minimumise fire risk.
II. Use of basic tools and precautions.
III. Explain workshop safety practises.
IV. Explain emergency control of machines and equipment.
V. Name and explain fire fighting equipment.
VI. Demonstration of use of safety wear.
VII. Describe safe and proper conduct in the workshop.
VIII. Describe the correct action taken against electrical hazards.
IX. Extinguish small fires.
X. Use survival first aid procedures.
XI. Demonstrate artificial resuscitation in case of electrical shock.

Identify types of Wiring System

- Discuss the various types e.g. P.V.C. M.I.C.S. conduct trunking and application.
- Discuss underground, cable ducts systems.
- Recognise the purpose of the above systems.
- Determine sizes of conduct, trunking ducts.
- Construct the respective system.
- Employ the bends used: Offset; 90% goose and other related fittings by indication.
- Employ the use of fittings and components.
- Draw circuit arrangement layout of cables.
- Introduce line and circuit diagrams.
- Demonstrate one, two and three way switching arrangement.
- Demonstrate switching from various positions e.g. at source and lamp position.
- Discuss sinle and multi phase A.C. System.
- Discuss two and three wire single phase system.
- Employ voltage and current characteristics and values e.g. 3 relationship phase and line values.

- Employ general layout of lighting circuits; and power circuits
- Apply I.E.E regulations.
- Apply method of looping system.

- Demonstrate fixing of cable to walls (strapping, clipping, grouping)
- Employ
    I. Wiring of cooker circuit.
    II. Radial Circuit.
    III. Ring Circuit and
    IV. An Emergency Circuit
    V. Bell and announciator Circuits

- Select correct cable size.
    I. Use of I.E.E tables for cable selection and voltage drop.
    II. Application of correction factor.
    III. Calculation for actual and permitted voltage drop.

Testing of Completed Installation and Appliances

I. Using installation and resistance tester (Megger).
II. Order of testing – Polarity, Earthing and Continuity.
III. Use of series lamp for continuity test.
IV. Purpose of testing.
V. Demonstration of test.

Explain and Illustration Sequence of Control

- Design meter circuits.
- Construct various types of distribution boards.
- Arrange and assemble final sub-circuits.