DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

CERTIFICATE

Certificate in Electrician Course
(CEC)

(Yearly Scheme)

COURSE TITLE : CERTIFICATE IN ELECTRICIAN COURSE
DURATION : 2 YEARS
MODE : YEARLY
TOTAL MARKS : 800

FIRST YEAR

COURSE TITLE	*Paper Code*	*MARKS*				
		THEORY		*PRACTICAL*		*TOTAL MARKS*
		INTER-NAL	*EXTER-NAL*	*INTER-NAL*	*EXTER-NAL*	
INTRODUCTION TO TRADE THEORY	CEC/Y/110	40	60	NA	NA	100
WORKSHOP CALCULATION & SCIENCE	CEC/Y/120	40	60	NA	NA	100
BASICS OF ENGENEERING DRAWING	CEC/Y/130	40	60	NA	NA	100
PRACTICAL	CEC/Y/140	NA	NA	40	60	100

SECOND YEAR

COURSE TITLE	*Paper Code*	*MARKS*				
		THEORY		*PRACTICAL*		*TOTAL MARKS*
		INTER-NAL	*EXTER-NAL*	*INTER-NAL*	*EXTER-NAL*	
ADVANCE TRADE THEORY	CEC/Y/210	40	60	NA	NA	100
WORKSHOP CALUCATION & SECIENCE	CEC/Y/220	40	60	NA	NA	100
ADVANCE ENGENEERING DRAWING	CEC/Y/230	40	60	NA	NA	100
PRACTICAL	CEC/Y/240	NA	NA	40	60	100

Note:
Theory Paper : 40% Continuous Internal Assessment and **60%** University examination.
Practical Paper : 40% Continuous Internal Assessment and **60%** University examination

FIRST YEAR

INTRODUCTION TO TRADE THEORY **Subject Code: CEC/Y/110**

S.NO. **THEORY**

1. Introduction to the trade, Scope for training in the trade, safety precautions, Elementary first aid, etc.

2. Description specifications, General care and maintenance of common hand tools, identification and measurement of bolts, nuts and screws, Electron theory, miniature solar system – elements, atom and free electron. Fundamental terms definitions and units etc. Effects of Electric Current.

3. Qualities of good electrical conductors , common conductors, their shape, sizes and use of wire gauge etc. Insulated conductors in general use their kinds as regards insulation and voltage, grades low, medium and high voltage, precautions in using Aluminum conductor cables.

4. Soldering, its purpose different percentage of solder used, use of flux, different fluxes for different purposes or metals, use of resin and core solder, Description of soldering equipment. Care and maintenance, blow lamp.

5. Common electrical accessories, their specifications, common insulating materials used. Ohm's law and its application. Different types of resistances. Series connection of appliances or resistances and its characteristics/uses. Use of Voltmeter and Ammeter.

6. Parallel circuit its characteristics and application. Use of protective devices like fuses, earthing etc. Graduation of fuses.

7. Work, power and Energy their inter relation calculation of Power and energy in electrical circuits. Ohm's law simple problems.

8. Chemical effects of electric current, principle of electrolysis Faraday's Law of electrolysis, electrochemical equivalents. Values of ECE for different electrolytes. Explanation for a node and cathode etc.

9. Magnetism –terms used and shapes of magnets. Properties of magnets, general care and maintenance. Methods of magnetizing. Magnetic materials.

10. Principles of electro-magnetic inductions, cork screw rule, right hand thumb rule, magnetic field of a current carrying conductor, Faraday's equations. Principle of electro law, Lenz's Law, resistance Variation of resistance with temperature. Material, cross-section and length.

11. Principle of D.C.generator, Fleming's right hand rule, use of slip rings and split rings and the function of commutator.

12. Parts and function of D.C. generator, EME equation, self and separately exited generators, their application in practical field, use of Megger

13. Types and characteristics of D.C. generators, such as series, shunt and compound and their application. Simple problems on electrical circuits, Making a circuit diagram

14. Magnetism-turns used and shapes of magnet. Properties of magnets, general care and maintenance methods of magnetizing. Magnetic materials.

15. Principles of electro-magnetic inductions, cork screw rule, right hand thumb rule, magnetic field of a current carrying conductor and loop, earth magnetism, solenoid and its polarity, palm rule etc. Magnetic terms and magnetic induction, faraday's equations. Principle of electro law, Lenz's law, resistance variation of resistance with temperature. Material, cross- section and length.

16. Principle of D.C. generator, Fleming's right. Hand rule, use of slip rings and split rings and the function of commutator

17. Parts and functions of D.C. generator, EME equation, self and separately exited generators, their application in practical field, of Megger

18. Types and characteristics of D.C. Generators, such as series shunt and compound their application. Simple problems on electrical circuits, making a circuit diagram.

19. Armature reaction, use of interlopes and their polarity, connection of interpoles. Commutation. Electro-magnetic drag, Fleming's Left hand rule. Principle of D.C. Motors.

20. Terms used in D. C. motors-such as torque, speed, back EMF etc. their relation and practical applications.

21. Types and characteristic of motors, industrial application of D.C. motors, starting methods.

22. Types of D.C. motor starter-3 point and 4 point protective devices used. Method of rolling speed D.C. motors –their advantages and disadvantages and industrial application.

23. Types, grades and sizes of insulated wires and cables such as rubber insulated CTS water

24. Proof PVC, multicored armour cable etc. Their selection as per standards lade down. Cross liner polythene.

25. Principle and description of voltaic. Cell, defects and remedies. Laclanche Cell and Dry Cell description, Voltages, advantages use, care and maintenance, grouping of cell, different voltages, advantages use, care and maintenance, grouping of cells, different Voltages and currents.

26. Lead acid cell, description of part, methods of charging, precautions to be taken and testing equipment .

27. General defects and remedies of lead acid cells. General maintenance and upkeep of lead acid cells and nickel-alkaline cells. General idea of growing importance of alternating current system with suitable examples.

28. Kirchhoff's Laws and its application, Wheatstone bridge and its application.

29. Alternating current and related terms via frequency, R.M.S. value etc with simple problems. General idea of standard sizes of casing and capping.

30. Resistance, capacitance and inductance, simple definitions: simple problems proving the effect of varying frequency, phase relationship, power and power factor. Identification of AC and DC Motors. Use of Wattmeter's and Energy meters.

WORKSHOP CALCULATION & SCIENCE **Subject Code: CEC/Y/0120**

1. UNITS

Introduction**--**Definition--classification of units--interrelationship between Metric and British System of units

2. SIMPLIFICATION

Introduction--fractions--decimal fractions--lowest common multiple, LCM.

3. SQUARE ROOT

Square and square root--symbol of root--method of finding out the squre root of a number--factorization method--division method.

4. RATIO AND PROPORTION

Introduction--ratio--proportion

5. PERCENTANCE

Introduction--persistence method

6. ALGEBRA

Introduction-careful consideration of subject items--addition and subtraction--multiplication and division--algebraic formula-factorization--equations

7. MENSURATION

Introduction-rectangle--square--parallelogram—rhombus--trapezium--triangle's- circle

8. TRIGONOMETRY

Definition--formula--measurement of angles

9. ELECTRICITY

Introduction--uses of electricity--molecule--atom--atomic structure--electric current AC. -DC.--ampere--EMF.--resistance--conductor--insulator--circuit

10. ELECTRICAL POWER AND ENERGY

Electric power--electric energy

11. EFFECT OF ELECTRIC CURRENT

Introduction---resistance --specific resistance—heating effect of electric current

12. ELECTRICAL MACHINES

Introduction---DC. Generator--DC. Motor ratio of transformer

BASICS OF ENGENEERING DRAWING **Subject Code: CEC/Y/0130**

1. INTRODUCTION, DRAWING INSTRUMENTS AND MATERIALS

Introduction— Drawing—drawing board—set-square—instrument box—pencil rubber—drawing sheet

2. CONVENTIONS FOR LINES, MATERIALS AND BREAKS

Introduction—convention for lines—grouping of lines—conventional breaks

3. FREE HAND LETTERING AND SKETCHING

Introduction—lettering—type of lettering—free hand sketching

4. GEOMETRICAL DRAWING

Introduction—points—line—curved line—angle—circle—square—rectangle

5. HAND TOOLS

Hammers—files—pipe wrench—pliers—spanner—hacksaws—drilling machines screwdriver—tester—chisel—try-square—vice—etc.

6. ELECTRICAL CIRCUITS AND DISTRIBUTION

Introduction—electrical circuits

7. RECTIFIERS AND INSULATORS

Introduction—full wave rect.—braze wave rectifier—pin type insu.—suspension type insulator

8. ELECTRICAL WINDING

Introduction—AC winding—DC-winding.

9. ELECTRICAL EARTHING

Introduction—plate earthing—pipe earthing

10. ELECTRICAL AND ELECTRONICS SYMBOLS

Positive—negative—DC—AC—fuse—bell—fan—lamp etc.—

PRACTICAL **Subject Code: CEC/Y-140**

1. Safety precautions, First aid, Hand Tools
2. Concept of Electricity
3. Symbols and Measuring Units
4. Conductors and insulators
5. Resistance & ohm’s law
6. Force, work, Power, Energy
7. Primary Cells, Secondary cell
8. Capacitors and Condensers
9. Magnetism and Electro-magnetism
10. Polyphase System

SECOND YEAR

ADVANCE TRADE THEORY **Subject Code: CEC/Y/0210**

1. Resistance, capacitance & inductance, simple definitions. Simple problems proving the effects of varying frequency phase relationship power and power factor identification of A.C.&D.C. meters use of Wattmeter's & energy meters .

2. A.C. circuit, simple problems on A.C. circuits containing R & XL; R & Xc.

3. Calculating current and voltage drop across each impedance of a circuit. General idea of conducts and its impedance accessories. I.E. rules pertaining to conduit pipe wiring. Polyphase circuits. Star-delta connections. Relation between line and phase voltage, Simple problems based on it . I.E. rules use of reference books and tables
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4. Alternators, parts , e.m.f. equation, regulations phase sequence, transformers construction working principle, cooling methods conduit capacities and I.E. rules pertaining to conduct pipe installations and earthing.

5. Working principle of induction motors, construction and characteristics of squirrel cage and slipping induction motors .

6. Single phase motors. Split phase, capacitor start repulsion and series motor-working principle parts and characteristics, starters. Types and characteristics.

7. Electric instruments, classification as regards forces employed. Constructional details of M.C. and M.I. type meters, dynamo-meters and hot wire instruments, constructional details of energy meter and use of shunt multiplier. Principle and of C.T. and P.T.

8. AC winding terms. AC armature winding terms coil side-coil end, coil group, and connections. Adjacent pole connected armature winding, lap and wave connected.

9. Coil wound armature, according to their shapes and arrangements, single and multicoils.

10. D.C. winding terms, introduction to winding terms such as lap winding. Pole pitch, coil winding pitch, back and front pitch progressive and retrogressive winding.

11. Neon signs, mercury and sodium vapor lamps: construction, characteristic and wattage available. Fluorescent tube-constructions, characteristics, size and wattage available. Types of lighting.

12. Electrons – electron emission cathodes, filaments supplies for anode plate. Constructions of a valve. Constructions features of a vacuum tube-different types of vacuum tubes. Rectifier on A. Cmains rectifier circuit, voltage load resistance. Half wave rectifications. Smoothing filters, rectifier for AC/DC supplies. Detector diode used as rectifier. Series and parallel rectifiers. Voltage doublers.

13. Valve characteristics, tube constants signal amplification equipment. Circuit of valve amplifiers.
14. Relative advantages and disadvantages over valves. Semi-conductors. N and P semi conductor junction. Types, properties emitter collector and base constructions details and connection to battery, equivalent circuit, transistor characteristics. Alpha and Beta

parameters common base common emitter and common collector configurations. Transistor as amplifiers Hybrid parameters. Bias stabilization of transistors.

15. Working principle & constructional detail in brief of signal generator AM/FM frequency modulator and AF oscillator, their uses in electronic circuits and precautions in handling these instruments.

16. Brief description about the working of various panel controls. Use of C.R.O. in the electronic circuits and precautions in handling the equipment

WORKSHOP CALCULATION & SCIENCE **Subject Code: CEC/Y/0220**

1. ALGEBRA

Introduction-careful consideration of subject items--addition and subtraction--multiplication and division--algebraic formulae-factorization--equations

2. MENSURATION

Introduction-rectangle--square--parallelogram— rhombus--trapezium--triangle--circle

3. TRIGONOMETRY

Definition--formula--measurement of angles—

4. ELECTRICITY

Introduction--uses of electricity--molecule--atom--atomic structure- -electric current-AC. DC.--Ampere--EMF.--resistance--conductor--insulator--circuit

5. ELECTRICAL POWER AND ENERGY

Electric power--electric energy

6. EFFECT OF ELECTRIC CURRENT

Introduction---resistance --specific resistance— heating effect of electric current

7. ELECTRICAL MACHINES

Introduction---DC.generator--DC. Motor ratio of transformer

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11. RATIO AND PROPORTION

Introduction--ratio--proportion-

12. PERCENTANCE

Introduction--persistence method

ADVANCE ENGENEERING DRAWING **Subject Code: CEC/Y/0230**

1. INTRODUCTION, DRAWING INSTRUMENTS AND MATERIALS

Introduction—Drawing—drawing board—set-square—instrument box—pencil—rubber drawing sheet--

2. CONVENTIONS FOR LINES, MATERIALS AND BREAKS

Introduction—convention for lines—grouping of lines—conventional breaks

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6 ELECTRICAL CIRCUITS AND DISTRIBUTION

Introduction—electrical circuits

7. RECTIFIERS AND INSULATORS

Introduction—full wave rect.—braze wave rectifier—pin type insu.—suspension type insulator

8. ELECTRICAL WINDING

Introduction—AC winding—DC-winding

9. ELECTRICAL EARTHING

Introduction—plate earthing—pipe earthing

10. ELECTRICAL AND ELECTRONICS SYMBOLS

Positive—negative—DC—AC— fuse—bell—fan—lamp etc.

PRACTICAL **Subject Code: CODE CEC/Y-240**

1. Transformers
2. A.c. motor
3. D.c. motor
4. Winding
5. D.c. Generators
6. Alternators
7. Wire & Cable
8. Electrical Measuring instruments
9. Definition of alternating & direct current