

KURÍKULUM
PENYAMBUNG KABEL T/BIASA
1313x

OBJECTIVES

The Apprenticeship Training programme is aimed at producing tradesmen having the following characteristics:-

- high degree of skill in the trade to which he shall be appointed at the end of the programme
- appreciative of the technicalities of his job
- aware of his responsibility as a party to implementing the NEB's functions and national aspirations

aware that his business is to serve the community

A tradesmen, following a normal career development and advancement path, usually proceed to become junior technician as a promotional process. The formal apprenticeship training programme at the Training Institute, therefore, is not only to provide him with the immediate need of the skill as a tradesmen, but also a preparation for his advancement to higher post, with short supplementary upgrading courses.

As the stress is on the acquisition of industrial skill, the implementation of Technical (Industrial) Training should be made with minimum academic theoretical approach. As far as possible, actual job situation must be created, stressing the importance of industrial safety and regulations.

TRADE APPRENTICES CURRICULUM

COMMON MODULE (1300)	24 Weeks	1128 Periods	
	Periods Per Week	Total Periods (22 Weeks)	Page
I. <u>GENERAL TRAINING</u>			
- Mathematics	3	66	5
- Language and Communication	1	22	6
- Civics	1	22	7
- Islamic Studies	1	22	8
- Board's Regulations	1	22	9
- Physical Education	2	44	10
II. <u>TECHNICAL (THEORETICAL) TRAINING</u>			
- Principles of Electricity (Theory & Lab).	7	154	11
- Mechanical Sciences (Theory & Lab).	8	176	13
- Technical Drawing	3	66	15
III. <u>TECHNICAL (INDUSTRIAL) TRAINING</u>			
- Electrical Wiring/Installation	5	110	17
- Welding	6	66 (11 weeks)	18
- Fitting - Sheet Metal	5	110	20
- Machining	4	44 (11 weeks)	21
- Substation and Protection	4	44 (11 weeks)	22
- Transmission and Distribution	6	66 (11 weeks)	23

TRADE APPRENTICES CURRICULUM

CABLE JOINER

1ST MODULE (1313)	12 Weeks	564 Periods	
	Periods Per Week	Total Periods (11 Weeks)	Page
<u>I. GENERAL TRAINING</u>			
- Mathematics	3	33	25
- Language and Communication	1	11	26
- Civics	1	11	27
- Islamic Studies	1	11	28
- Board's Regulations	1	11	29
- Physical Education	2	22	30
<u>II. TECHNICAL (THEORETICAL) TRAINING</u>			
- Principles of Electricity (Theory & Lab).	7	77	31
- Mechanical Sciences (Theory & Lab).	6	66	32
- Technical Drawing (E)	3	33	33
<u>III. TECHNICAL (INDUSTRIAL) TRAINING</u>			
- Cable jointing practice LV/MV	22	242	34

TRADE APPRENTICES CURRICULUM

CABLE JOINTER

2ND MODULE (1313)	12 Weeks	564 Periods	
	Periods Per Week	Total Periods (11 Weeks)	Page
I. <u>GENERAL TRAINING</u>			
- Mathematics	3	33	35
- Language and Communication	1	11	36
- Civics	1	11	37
- Islamic Studies	1	11	38
- Board's Regulations	1	11	39
- Physical Education	2	22	40
II. <u>TECHNICAL (THEORETICAL) TRAINING</u>			
- Principles of Electricity	9	99	41
- Fundamentals of Electronics	3	33	42
III. <u>TECHNICAL (INDUSTRIAL) TRAINING</u>			
- Cable Joining Practice	26	286	43

TRADE APPRENTICES CURRICULUM

CABLE JOINTER

3RD MODULE (1313)	12 Weeks	564 Periods	
	Periods Per Week	Total Periods (11 Weeks)	Page
I. <u>GENERAL TRAINING</u>			
- Mathematics	2	22	44
- Language and Communication	1	11	45
- Civics	1	11	46
- Islamic Studies	1	11	47
- Board's Regulations	1	11	48
II. <u>TECHNICAL (THEORETICAL) TRAINING</u>			
- Principles of Electricity (Theory & Lab.)	10	110	49
- Fundamentals of Electronics	3	33	50
III. <u>TECHNICAL (INDUSTRIAL) TRAINING</u>			
- Cable Jointing Practice	22	242	51
- Substation	4	44	52
- First Aid And Artificial Respiration	2	22	53

COMMON MODULE

MATHEMATICS

Common Module

66 Periods

- Daily Arithmetic
 - . Daily business
 - . Percentages

- Operation With Numbers
 - . Reciprocal
 - . Square and square roots
 - . Surds
 - . Exponent

- Geometry
 - . Area
 - . Volume
 - . Circle
 - . Similar triangles

- Trigonometry
 - . Pythagoras theorem
 - . Trigonometric ratios

- Algebraic Process
 - . Addition, subtraction, multiplication and division of algebraic expressions
 - . Linear simultaneous equation

LANGUAGE AND COMMUNICATIONS
(Bahasa Malaysia and English)

Common Module

22 Periods

- **Oral Expression**
 - . Pronunciation
 - . Language etiquette
- **Vocabulary Expansion**
- **Comprehension**
 - . Idea analysis
 - . Assembly and organisation of ideas
 - . Precis
- **Letter writing**
 - . Informal
 - . Formal

CIVICS

Common Module

22 Periods

- **Role of individual in society**
- **Work as a trust**
- **Cultures**
 - . **Cultural development in Malaysia**
 - . **Realisation of national culture**
- **Government**
 - . **Systems of government**
 - . **Government of Malaysia**
 - . **Government Agencies**
- **Industrial Relations**

ISLAMIC STUDIES

Common Module

22 Periods

- **Tauhid (Akidah)**
 - . Perkembangan pemikiran manusia
 - . U gama sebagai sistem hidup
 - . Rukun Taqwa dalam Islam
 - . Konsep-konsep Rukun Iman dan Islam

- **Tasauwuf (Akhlak)**
 - . Ibadat sebagai alat kegigihan Iman
 - . Berhemah tinggi
 - . Merendah diri dalam Islam
 - . Sabar
 - . Ikhlas
 - . Takabbur

- **Fiqah (Syariah)**
 - . Kefardhuan dan hikmah sembahyang
 - . Pendekatan manusia kepada sembahyang
 - . Sembahyang Jumaat
 - . Sembahyang Jamaah

BOARD'S REGULATIONS

Common Module

22 Periods

- Organization of the L.L.N.
 - . Technical functions of L.L.N.
 - . Functional divisions of L.L.N.
 - . Organization of power stations
 - . Organization of L.L.N. districts

- Terms and Conditions of Service
 - . Recruitment and appointment
 - . Promotions and transfer
 - . Working hours
 - . Disciplines

- Perquisites
 - . Normal allowances
 - . Leaves

PHYSICAL EDUCATION

Common Module

44 Periods

To develop physical fitness, agility and team spirit in preparation for the trainees to be familiar with strenuous and vigorous manual work.

Achieved by:-

- Various exercises
- Gymnastics
- Games

PRINCIPLES OF ELECTRICITY
(Theory and Lab.)

Common Module

154 Periods

- **Electrical Current**
 - . Nature
 - . Conducting and non-conducting bodies
- Sources of E.M.F.
- Types of Electrical Current
- Basic Electrical Units
- Electrical Cells
 - . Types and Construction
 - . Connection configuration
- Electrical Resistance
 - . Ohm's Law
 - . Resistivity
 - . Temperature Effect
 - . Connection configuration
- Kirchoffs' Law
- Electrical Power and Energy

- Magnetism

- . Magnetic Field
- . Magnetic Induction
- . Magnetic Flux
- . Hysteresis
- . Effect of magnetic field on conductors
- . Motor Effect
- . Electromagnetism - Application of electromagnet (Contactors)

- Electromagnetic Induction

- . Lenz's Law
- . Self Induction

- Capacitor

- . Capacity
- . Charge and discharge
- . Connection Configuration

MECHANICAL SCIENCES
(Theory & Lab.)

Common Module

176 Periods

METROLOGY

- **Units of Physical Measurement**
 - . Imperial and metric Systems
 - . Inter system conversion
- **Linear and Angular Measurements**

FUNDAMENTAL MECHANICS

- **Scalar and Vector Quantity**
- **Mass and Weight**
 - . Density
 - . Specific gravity
- **Forces**
 - . Composition and resolution
 - . Equilibrium
 - . Parallelogram of Forces
- **Moments, level, torque and pulley**
- **Work, energy and power**

PHYSICAL SCIENCE

- **Pressure**
 - . Solid and liquid states
 - . Pressure measurements
 - . Flotation principle

- **Heat and Temperature**
 - . Heat effect (Expansion in solids, liquids and gases)
 - . Heat transfer
 - . Quantity of heat
 - . Specific heat
 - . Latent heat

METALLURGY

- **Types of Materials**
 - . **Metals** (Ferrous and Non-Ferrous)
 - . **Non-metals**

- **Strength of Materials**
 - . Ductility
 - . Elasticity
 - . Malleability
 - . Hardness
 - . Toughness
 - . Brittleness

TECHNICAL DRAWING

Common Module

66 Periods

- Drawings
 - . Mechanical, electrical and civil blueprints
- Drawing Equipment
 - . Identification and use
 - . Paper Selection
- Lines
 - . Types and weighting
- Lettering
 - . Styles
- Scaling
- Dimensioning
 - . Aligned and unidirectional
- Geometry and Development
 - . Polygons and ellipses
 - . Bisection

- Projections

- . Pictorial
- . Orthographic, 1st and 3rd angle
- . Conversion of orthographic to pictorial

ELECTRICAL WIRING/INSTALLATION

Common Module

110 Periods

- Introduction to Wiring/Installation Workshop
- Preparation of Conductors
 - . Types of conductors
 - . Exposing/baring
- Terminations
 - . Crimping and soldering of lugs
 - . At switches, plugs, distribution boxes
- Surface Wiring
 - . Lighting circuits
 - . Power circuits
 - . Discharge lighting
- Installation and Maintenance of Appliances
 - . Electric bell
 - . Stove
 - . Fan and regulator
 - . Water heater
 - . Lift

WELDING

Common Module

66 Periods

- Introduction to Welding Workshop
- Arc Welding Technique
 - . Safety precautions in Arc welding
 - . Laying stringer beads
 - . Laying straight line
 - . Laying weaved beads by Arc welding
 - . Arc length
 - . Welding Positions
 - . Metal Building-up
- Electrodes for Arc Welding
- Types of joints
 - . Fillet weld Tee Joint
- Weld defects in Arc Welding
- Gas welding Techniques
 - . Safety precautions in gas welding
 - . Setting up of gas plant
 - . Flames used in gas welding
 - . Laying beads without filler rod
 - . Systems in Oxy-acetylene welding
 - . Techniques adopted in gas welding
 - . Laying beads with filler rod

- Filler Rods for gas Welding
- Weld defects in gas welding
- Butt joint by gas welding
- Brazing
 - . Tee Joint and Butt Joint
- Gas Cutting
 - . Manual Cutting
 - . Profile Cutting

FITTING/SHEET METAL

Common Module

110 Periods

FITTING

- Introduction to Fitting Workshop
- Marking and Work Holding
- Filing
- Hacksawing
- Measuring Instruments
- Clamps
- Fitting
- Chipping
- Drilling
- Rivetting
- Reaming, Tapping and Dicing

SHEET METAL

- Introduction to Sheet Metal Workshop
- Marking Out
- Cutting
- Mechanical Joints
- Soldering
- Simple Development
- Stakes
- Drilling
- Rivetting

MACHINING

Common Module

44 Periods

- Introduction to Machining Workshop

- Turning
 - . Introduction to Lathe Machine
 - . Plain turning
 - . Step turning
 - . Taper turning
 - . Chamfering
 - . Knurling
 - . Parting off

- General Machining
 - . Introduction to milling, shaping and drilling machines
 - . Types of cutting tools used on milling, shaping and drilling machines
 - . Rectangular block milling
 - . Milling of a "U" block
 - . Grinding of plain cylinder

SUBSTATION/PROTECTION

Common Module

44 Periods

- **Identification and information on substation equipment and accessories**
 - . Types of substations
 - . Types of distribution substations
 - . Identification and function of equipment
 - . Standard layout of distribution substation

- **Identification and Function of Fuses**
 - . Fuse terminology
 - . Identification of types of fuses
 - . Discrimination of fuses
 - . Fuse application
 - . Installation and care of fuses
 - . Replacement/installation of fuse in H.F.U.

TRANSMISSION AND DISTRIBUTION

Common Module

66 Periods

- Generation, transmission and distribution of electrical energy
- L.V. Overhead Line
 - . Identification of components
 - . Knots
 - . Lifting and handling
 - . Safety belts, ladders and ropes
 - . Dressing of pole
 - . Planting of pole
 - . Climbing of pole
 - . Drum handling
 - . Conductor laying
 - . Binding of stay
- Underground distribution
 - . Types of underground cable
 - . Drum handling
 - . Cable construction
 - . L.V. Cable joint (demonstration only)
 - . Gas equipment
 - . Stripping a L.V. cable

- Pretinning of copper and aluminium earth tape
- Socketing process for cable up to 70 mm²

NOTE:

Emphasis will be given to safe handling aspects and proper handling techniques.

FIRST MODULE

MATHEMATICS

First Module

33 Periods

- Algebraic

- . Revision on algebraic processes
- . Revision on linear simultaneous equation
- . Quadratic equation

- Trigonometry

- . Fundamental relationship between sine, cosine and tangent
- . Sinusoidal function

- Circle

- . Further treatment on properties of

- Vectors

- . Addition and subtraction of

LANGUAGE AND COMMUNICATION
(Bahasa Malaysia And English)

First Module

11 Periods

- **Oral Expression**
 - . **Further treatment on language etiquette**
 - . **Debates**

- **Vocabulary Expansion**

- **Comprehension**
 - . **Further treatment on analysis, assembly and organisation of ideas**

CIVICS

First Module

11 Periods

- Honesty and Integrity
- Modesty
- Achievement and Pride
- Self Control and Respect
- Personal Manners
- Role of Public Servants
- Public Relations

ISLAMIC STUDIES

First Module

11 Periods

- Tauhid
 - . Fungsi ambia dan rasul

- Fiqah
 - . Kefardhuan dan hikmah puasa
 - . Pendekatan manusia kepada puasa
 - . Jenis dan cara-cara berpuasa

- Sejarah
 - . Perkembangan Islam sebelum Hijrah

BOARD'S REGULATIONS

First Module

11 Periods

- Organization of L.L.N.
 - . Functions of departments relevant to tradesmen

- Terms and Conditions of Service
 - . Overtime
 - . Uniforms
 - . Accident at Work

- Perquisites

Further treatment on:-

- . Leaves
- . Allowances

PHYSICAL EDUCATION

First Module

22 Periods

To develop physical fitness and agility
and team spirit in preparation for the trainees to
be familiar with strenuous and vigorous manual work.
Achieved by:-

- Various exercises
- Gymnastics
- Games

PRINCIPLES OF ELECTRICITY
(Theory and Lab.)

First Module

77 Periods

- **Electro-magnetic Induction**
 - . Further treatment on

- **Capacitor**
 - . Further treatment on

- **Single Phase A.C.**
 - . Generating of A.C.
 - . Properties of A.C.
 - . Electrical parameters in A.C.
 - . Active and reactive power
 - . Power factor

- **Static Machine**
 - . Principles of transformation and transformation ratio.
 - . Principles of transformer construction and types
 - . Performance of transformers

- **Three Phase Generation**
 - . Principle of

MECHANICAL SCIENCES
(Theory & Lab.)

First Module

66 Periods

- **Metrology**
 - . **Engineering measurements,
(tolerance, limit and fit)**

- **Fundamental Mechanics**
 - . **Friction**
 - . **Wheel and Axle**
 - . **Inclined plane and screw**
 - . **Basic kinematics**

- **Physical Science**
 - . **Coefficients of expansion**

- **Metallurgy**
 - . **Heat treatment**

TECHNICAL DRAWING (E)

First Module

33 Periods

- Section and half Section and Symbols for materials

- Electrical Diagrams and Symbols

- Pipe Diagrams and Pipe Symbols

- Cabling Layout and Symbols

CABLE JOINTING
(LV & MV Only)

First Module

242 Periods

- Revision on Cable Technology and Construction
- Drum Handling
- Cable Laying
- Gas Equipment (revision)
- Safety Precaution
(Working site preparation)
 - . Checking cable insulation
 - . Discharge of cables
 - . Traffic notices
 - . Wooden props (planks)
 - . Gas removal from pit
 - . Placement of gas tank
 - . Fire fighting
- Cable Termination
(6 exercises to be performed by each trainee for each type of termination)
 - . Cable setting
 - . Plumbing
 - . Taping
 - . Cable box installation
 - . Earthing of screen

- Straight Through Joint
(A minimum of 6 exercises to be performed by each trainee)
 - . Cable setting
 - . Plumbing
 - . Taping
 - . Alignment
 - . Jointing
 - . Cable box installation

- Cable Testing
 - . Phasing out
 - . Insulation

- Cable Fault Location

SECOND MODULE

LANGUAGE AND COMMUNICATION
(Bahasa Malaysia And English)

Second Module

11 Periods

- Oral Expression
 - . Debates
 - . Telephone conversation

- Vocabulary Expansion

- Essay Writing
 - . Formulation of ideas
 - . Assembly of ideas

- Report Writing
 - . Log reporting
 - . Journalistic reporting

CIVICS

Second Module

11 Periods

- Constitution
- Citizenship
- Election
- Legal System
- Integrity of Law
- Crime and Punishment (Arrest)
- Social Sensitivities and Tolerances

ISLAMIC STUDIES

Second Module

11 Periods

- Sejarah

- . Perkembangan Islam selepas Hijrah
- . Islam semasa Khalafa Arrasyidin
- . Islam selepas Khalafa Arrasyidin
- . Punca kejatuhan kerajaan Islam

- Tasauwuf

- . Amanah
- . Pemurah
- . Mengumpat
- . Hasad dan fitnah

BOARD'S REGULATIONS

Second Module

11 Periods

- **Service Ethics**
 - . Confidential Report
 - . Personal Grievances
 - . Employees' Unions

- **Administrative Procedures**
 - . Financial
 - . Stores
 - . Security of Board's Properties

- **Perquisites**
 - . Housing and Other Loans
 - . Housing facilities

PHYSICAL EDUCATION

Second Module

22 Periods

To develop physical fitness and agility
and team spirit in preparation for the trainees to be
familiar with strenuous and vigorous manual work.

Achieved by:-

- Various exercises
- Gymnastics
- Games

PRINCIPLES OF ELECTRICITY
(Theory & Lab.)

Second Module

99 Periods

- Capacitors and Inductors
 - . Further treatment on their characteristics
- Resonance
- Power Factor Improvement
- Three Phase Systems
 - . Revision on three phase generation
 - . Relationship between Line and phase quantities
 - . Three phase connections
 - . Balanced and unbalanced three phase loads
- Generators
 - . Principles of generator construction
 - . Principles of commutation
 - . Generator characteristics
 - . Generator efficiency
- D.C. Motors
 - . Principles of motor function
 - . Construction
 - . Characteristics
 - . Efficiency

FUNDAMENTALS OF ELECTRONICS

Second Module

33 Periods

- Electronic Components
 - . Symbols
 - . Characteristics

- Construction Practice
 - . Hand tools
 - . Electronic wiring
 - . Electronic soldering

- Use of Test Equipment
 - . Electronic multimeters
 - . Oscilloscope
 - . Signal generator
 - . Stabilised power supplies

- Simple Circuits
 - . Interpretation of basic circuit diagrams
 - . Construction of circuits

CABLE JOINTING PRACTICE
(LV/MV)

Second Module

286 Periods

Further exercises on Jointing and termination,
based on first module. Emphasis on refinement of technique
and quality shall be made.

THIRD MODULE

MATHEMATICS

Third Module

22 Periods

Revision on the common, the first and
the second modules.

LANGUAGE AND COMMUNICATION
(Bahasa Malaysia And English)

Third Module

11 Periods

- Oral Expression
 - . Interviews
 - . Conducting of meetings

- Essay Writing
 - . Further exercises
 - . Report writing

- Comprehension
 - . Further exercises on precis

CIVICS

Third Module

11 Periods

- Taxation
- Expenditure
- Personal manners
- Right and wrong
- Man and his family

ISLAMIC STUDIES

Third Module

11 Periods

- Tauhid
 - . Bidaah dan khurafat
 - . Kesempurnaan i'tiqad

- Fiqah
 - . Fardhu ain dan fardhu kifayah
 - . Menyempurnakan mayat
 - . Punca-punca hukum Islam
 - . Mazhab

- Tasauwuf
 - . Hidup untuk keredhaan Allah

BOARD'S REGULATIONS

Third Module

11 Periods

- Organization of the L.L.N.
 - . Historical development of L.L.N.
 - . Electricity Act
 - . Career development and advancement
 - . Circulars

- Terms and Conditions of Service
 - . EPF and pensions

- Perquisites
 - . Medical facilities

PRINCIPLES OF ELECTRICITY
(Theory & Lab.)

Third Module

110 Periods

- Three Phase A.C. Motors
 - . Principle of rotating field
 - . Types of induction motors
 - . Starting methods
 - . Power factor
 - . Efficiency

- Single Phase Induction Motor
 - . Principle and types

- Power Rectification
 - . Principle of rectification
 - . Single phase rectification
 - . Three phase rectification
 - . Smoothing circuits

- Electrical Cells
 - . Action and characteristics of lead acid and alkaline cells
 - . Ampere hour and watt hour efficiencies

- Electrical Measurements
 - . Measurement of resistance by substitution
 - . Measurement of resistance by Wheatstone Bridge
 - . Potentiometer
 - . Measurement of resistance by potentiometer
 - . Measurement of E.M.F. of a cell

FUNDAMENTALS OF ELECTRONICS

Third Module

33 Periods

- Test Equipment/Measurement
 - . Oscilloscope
 - . Multimeters
 - . Signal generators

- Circuit Practice
 - . Power supplies
 - . Amplifiers
 - . Oscillators
 - . Simple switching circuits
 - . Relays

- Simple Electronic Systems
 - . Audio amplifier
 - . Switching circuits

- Construction Practice
 - . Soldering
 - . Wiring

CABLE JOINTING PRACTICE (LV/MV)

Third Module

242 Periods

- Further Exercises On Jointing and Terminations

- Introduction to Live Line Practice

- Introduction to 11 kV Jointing

SUBSTATION

Third Module

44 Periods

- Testing Equipment
 - . Phasing Stick
 - . Pressure test set
 - . Phase rotation indicator
 - . Voltage indicator
 - . Fault location equipment

- Identification of Switchgears

- Introduction to District Systems Operation

FIRST AID AND ARTIFICIAL RESPIRATION

Third Module

22 Periods

- Rescue
 - . Release from live equipment

- Resuscitation
 - . Treatment after contact with live conductors
 - . Artificial respiration
 - . External cardiac massage

- First Aid for Injuries
 - . First aid kit
 - . Wounds and bleeding
 - . Shock
 - . Burns and scalds
 - . Foreign body in the eye
 - . Fractures
 - . Unconsciousness