



*Govt. of India
Ministry of Labour & Employment
Directorate General of Employment & Training*

ADVANCED TRAINING INSTITUTE

VIDYANAGAR , HYDERABAD – 500007, A.P.

**DRAFT SYLLABUS
FOR**

“ TRADE : “ ELECTRICIAN “

UNDER

**CRAFT INSTRUCTOR TRAINING COURSE
(Modular Pattern)**

***DURATION* : 3 MONTHS (12 WEEKS)**



**LIST OF MEMBERS OF THE TRADE COMMITTEE MEETING HELD ON 26.6.2009 AT
A.T.I. HYDERABAD TO DESIGN THE SYLLABUS FOR ELECTRICIAN TRADE
(Modular Pattern) UNDER C.I.T.S.**

SL. NO.	NAME& DESIGNATION	REPRESENTING ORGANISATION	COMMITTEE MEMBERS
	<u>S/SHRI</u>		
1.	R. K. CHUGH, <i>Director</i>	A.T.I., Hyderabad	Chairman
2.	Y. Balaji Raj, <i>Scientist – E</i>	ARCI, Hyderabad	Member
3.	D.S.Setty, <i>Scientific Officer-G</i>	NFC, Hyderabad	Member
4.	M. Shiv Kumar, <i>Dy. Genl. Manager</i>	BHEL, Hyderabad	Member
5.	N.Dattatrayulu, <i>DEE/ELS/SC</i>	South Central Railway	Member
6.	S.S.SuryaPrakash Rao, <i>Engineer</i>	Petti laminations Ltd.	Member
7.	P.Chandrashekar Reddy, <i>Jr.Engineer</i>	Petti laminations Ltd.	Member
8.	Sathyashankar B. P., <i>Joint Director</i>	A.T.I., Hyderabad	Member
9.	S. Suryanarayana, <i>Deputy Director</i>	A.T.I., Hyderabad	Member
10.	K. N. Halder, <i>Deputy Director</i>	ATI–EPI, Hyderabad	Member
11.	P. M. Radhakrishna Pillai, <i>Trg. Officer</i>	C.T.I., Chennai	Member
12.	Girish Deshpande, <i>Training Officer</i>	R.D.A.T., Hyderabad	Member
13.	R. N. Manna, <i>Training Officer</i>	CSTARI, Kolkata	Member
14.	M. Joshoua, <i>Assistant Director</i>	A.T.I., Hyderabad	Member
15.	S. Venu Gopalan, <i>Training Officer</i>	A.T.I., Hyderabad	Member
16.	T. K. Bhattacharya, <i>Training Officer</i>	A.T.I., Hyderabad	Member
17.	A. K. Samaddar, <i>Training Officer</i>	A.T.I., Hyderabad	Member

ADVANCED TRAINING INSTITUTE, VIDYANAGAR, HYDERABAD-500 007 (A.P)

DRAFT DESIGNED SYLLABUS FOR ELECTRICIAN (CTI) MODULE
TRADE TECHNOLOGY – 1 (3 MONTHS)

Week No.	Trade Theory Morning Session (09-00 am to 1-00 pm)	Practicals Afternoon Session (1-30 p.m. to 5-30p.m)
1	Safety – Accident – artificial respiration methods Ohms law – Grouping of Resistors, capacitors and cells – numerical related to the above	Ohm’s law verification – Grouping of resistors, capacitors and cells in different combinations and verifying with calculated values for different parameters.
2	Measurement of resistance by different methods – Wheatstone bridge, LCR bridge – Krichoff’s law – solving for current, voltage and power in different network circuits – heating effect of electric current	Measurement of resistance by different methods – assemble different types of circuits and measuring the values by comparing the calculated values.
3	Calibration of AC/DC voltmeter, Ammeter, Wattmeter, energy meter by different methods. Work, power and Energy – Solving for the different ckts	Calibration of AC/DC voltmeter, Ammeter, Wattmeter, Energy meter by different methods.
4	AC fundamentals – solving RLC circuits for different parameters in single phase UNIT/MONTHLY TEST	Measurement of R,L,C,Z, Power, Energy by different methods in single phase – series and parallel circuit UNIT / MONTHLY TEST
5	Star and delta connections in three phase circuits – Solving RLC circuits in three phase – derivation of formula for three phase power Power factor and its importance – PF improving methods – disadvantages of low power factor – real, apparent, and reactive power	Study and comparison of phase voltage, phase current, line current and power in star and delta connection in 3 phase circuit. Measurement of PF by different methods in single phase and three phase circuits.
6	Primary and secondary cells, their construction and working – lead acid battery in detail – charging methods – battery charger circuits – general maintenance	Grouping of cells for different values of voltage and power – trace out the circuit of battery charger – charge the battery in different methods.
7	Magnetism and electro magnetism – terminology used – magnetic circuits – magnetic induction – Faraday’s law, BH curve. Fuse – its importance, rating – MCB, MCB DB, ELCB, Construction, types and working.	Preparation of electro-magnet for different powers as per calculation and measure the output Familiarization with latest wiring accessories and their connection

Contd... 2

8	Wiring systems and types – comparison between different types of wirings – installation -0 testing methods. Earthing – methods – pipe and plate – earthing in detail, measurement of earth resistance. UNIT / MONTHLY TEST	House wirings for different circuits with latest accessories Industrial wiring for installation in single phase and three phase motors. Installation of pipe and plate earthing. Earth resistance measurement by different methods UNIT/MONTHLY TEST
9	Parts and working of fluorescent tube, HPMV and HPSV lamps. Wiring estimation of domestic and industrial installation.	Connection of fluorescent tube. HPMV and HPSV lamps and their trouble shooting. Industrial wiring for installation in 3 phase motors and starters.
10	DC generator – classification – characteristics of shunt, series and compound generators and its application – loading and voltage regulation – parallel operation – armature reaction and commutation – efficiency – care and maintenance – trouble shooting etc.,	Dismantling and re-assembling of C generator – starting, running and loading – plotting characteristics – finding efficiency – determination of efficiency by direct and indirect method. General maintenance
11	DC Motor – principle and types – characteristic and application – starters and necessity – construction and working of starters – speed control methods – efficiency – trouble shooting – care and maintenance.	Dismantling and re-assembling of DC motors and starters, starting, running and loading – measuring different parameters and determine the efficiency – Speed control of d.c. motors. - general maintenance
12	Transformer – principle, construction and types – EMF equation, rating – loading – losses and efficiency – instrument transformers and their application – parallel operation – cooling methods – auto transformer – transformer oil testing – numerical on transformer Introduction of inverters, medium frequency welding transformer UNIT / MONTHLY TEST PRE-FINAL TEST	Dismantling and re-assembling of Transformer – determination of voltage regulation and losses in single phase and three phase transformers – connection of star and delta combination by using AC single phase transformers – connection of CT and PT with selector switch and connection with the different measuring instruments. UNIT / MONTHLY TEST/ PRE-FINAL TEST

N.B. At the end of every month, monthly test is to be conducted.
All tools & equipments as per C.T.S. of N.C.V.T.

ADVANCED TRAINING INSTITUTE, VIDYANAGAR, HYDERABAD-500 007 (A.P)

DRAFT DESIGNED SYLLABUS FOR ELECTRICIAN (CTI) MODULE
TRADE TECHNOLOGY - II (3 MONTHS)

Week No.	Trade Theory Morning Session (09-00 a.m. to 12-00 Noon)	Practicals Afternoon Session (12-30 to 5-30 p.m)
1	Block diagram of Hydro, Thermal and Nuclear power Principle, types and construction of alternator – excitation methods – voltage and frequency adjustments – loading and characteristics – parallel operation of alternators – advantages, conditions and methods. Drop parameter significance. Difference between ordinary alternator and Brush less alternator Care and maintenance – trouble shooting	Dismantling and re-assembling, voltage and frequency adjustment – loading – voltage regulation – characteristics – synchronizing by different methods – finding efficiency General maintenance and trouble shooting
2	Parts, construction and working of induction motor – classification – difference between sq. cage and slip ring motor – application – Motor starters, construction and working – necessity and selection Speed control methods – Slip and its measurement. Speed control of 3 phase inductor motor by VVVF method. A.C. drive – an introduction. Classification of single phase motors – parts, construction and working – application – Trouble shooting	Dismantling and re-assembling of different types of single and three phase motors Connection with different starters Measurement of current, power, energy, slip, power factor etc. Dismantling and re-assembling of different motor starters Assembling of motor starter circuits for various application by using contactors, overload relay, push buttons and timers General maintenance
3	Study of power factor in details – disadvantages of low power factor – power factor improvement methods – calculation of actual, apparent and reactive power – capacitor bank calculation Synchronous motor – parts, construction and working – excitation adjustments for power factor – study of V-curve of synchronous motor – Automatic correction of P.F.	Measurement of power factor by different methods Measurement of True, Apparent and Reactive power on inductive load and calculate and install the required capacitor bank to improve the power factor of required values Run the synchronous motor and plot and study the V curve
4	Single line diagram of sub-station – over head and underground lines, their comparisons – over head line terminology – line protecting equipments – Lightning arrestor. Construction of underground cable – types of faults and its trouble shooting – Study of non conventional energy sources – wind, solar power station UNIT/MONTHLY TEST	Industrial visit of sub-station – familiarization with different over head line insulators and lighting arrestors – familiarization with different types of underground cables used – crimping practice and gland fixing on different cables – study different types of circuit breaker, single line diagram of sub station. And sub station equipment, etc., UNIT MONTHLY TEST

5	Motor winding terminology – classification of conducting and insulating materials used in winding – Types and methods of winding in single and three phase motors.	Testing of burnt motor for rewinding – collection of data – developed diagram and connection – winding procedure – winding of table, ceiling fans, single phase and three phase motors – testing of would motor
6	Categorization of domestics appliances – heaters – washing machine, domestic mixie, hair dryer etc. and their construction and working	Dismantling and reassembling of different domestic appliances Repair different domestic appliances
7	Color coding of carbon resistors and capacitors – semiconductor diodes – Characteristics – rectifier circuits for half wave and full wave – filter circuits used – zener diode – characteristics	Familiarization with different electronic components – finding the resistor values bicolor code and comparing with multimeter. Testing of diode & transistors, and identification of loops. Study of CRO operation. Assembling of half, full wave rectifier circuits with different filters and study the wave form through the CRO.
8	Transistors – types and their application, characteristics – CE, CB and CC configuration – finding alpha and beta parameters. Oscillator circuit. CRO parts, construction, working and block diagram. UNIT / MONTHLY TEST	Assembling and study the working of CE Amplifier and oscillators. Study the input and output of Amplifier through CRO UNIT / MONTHLY TEST
9	SCR construction, working and its application – characteristics – firing methods DIAC and TRIAC construction, working and application – characteristics Study of common IC circuits using IC 741 and IC 555	Assembling the different SCR circuits and study its working Assemble the electronic fan regulator circuit and test it for its operation Familiarization with different ICs which are generally used in Op. Amp and Timer circuit regulators.
10	Study of UJT, IGBT its application Study of Op Amp. Circuits Study of regulator ICs circuits Study of number system – binary numbers in details.	Assemble different OP Amp circuits using 741 and study its working
11	Logic gates – its applications – multiplexers and De-multiplexers – Converters A/D & D/A. Logic sequence circuit for forward / reverse control of 3 phase induction motor Introduction to PLC systems.	Assembly regulator IC Circuits Study the different gate circuits in simulator and verify the output.
12	Project work/ Review of question paper PRE-FINAL TEST	Industrial visit. Pre-final Test

N.B. At the end of every month, monthly test is to be conducted.

All tools & equipments as per C.T.S. of N.C.V.T.