



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

# **ADVANCED TRAINING INSTITUTE**

**VIDYANAGAR , HYDERABAD – 500007, A.P.**

**DRAFT SYLLABUS  
FOR**

**“ TRADE : “ WIREMAN “**

**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 WIREMAN TRADE  
(Modular Pattern) UNDER C.I.T.S.**

<b>SL. NO.</b>	<b>NAME&amp; DESIGNATION</b>	<b>REPRESENTING ORGANISATION</b>	<b>COMMITTEE MEMBERS</b>
	<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 “WIREMAN”**

**TRADE TECHNOLOGY – I MODULE (CITS) : DURATION :3 MONTHS (12 WEEKS)**

Wk No.	Trade Theory Morning Session (09-00 a.m. to 12 Noon)	Practicals Afternoon Session (12-30 pm to 5-30 pm)
1	<b>ELEMENTARY ELECTRICITY</b>  1. Safety regulations 2. Elementary first aid 3. Elementary Electricity – Electron Theory 4. Classification of Materials, Use of common conductors and insulators 5. Static and Dynamic Electricity 6. Electrical Terms, Definitions, Units and Ohm’s Law 7. Effects of Electric current	<b>MAKING OF JOINTS IN T.W. BATTEN</b>  1. Straight joint 2. “T” Tee joint 3. Cross joint 4. Bridge joint
2	8. Simple Electric Circuit – Control and Safety devices 9. Series ckt. Characteristics and uses 10. Parallel circuit, characteristics and uses 11. Series and parallel circuit 12. Kirchoff’s Law and their applications 13. Condensers, Types, construction and working principle 14. Grouping of condensers 15. Work, power and energy	<b>MAKING JOINTS IN INSULATED P.V.C. CABLE</b>  5. Straight joint 6. Tee joint  <b>MAKING JOINTS IN BARE COPPER CONDUCTOR.</b>  7. Brittonia straight Joint 8. Brittonia Tee joint and Western union joint – soldering the joints 9. Test and maintenance of battery 10. Battery charging by (a) Constant current methods (b) Constant voltage method
3	<b>MAGNETISM</b> 16. Magnet, it’s properties and types 17. Terminology 18. Magnetic circuits 19. Magnetic Production, Molecular theory of magnetism 20. Magnetic materials and method of magnetization 21. Electromagnetism 22. Electromagnetic induction, self and mutual induction 23. Hysteresis and eddy current	11. CTS/PVC wiring on wood batten 12. Two L/P wiring in batten 13. Stair case wiring in Batten 1 Lamp controlled from 3 places

4	<p><b>WIRING</b></p> <p>24. Types of wiring system, cleat and casing, capping systems</p> <p>25. CTS/T.R.S. system and led sheathed wiring</p> <p>26. Conduits and their accessories</p> <p>27. Conduit wiring</p> <p>28. Comparison of different types of wiring</p> <p>29. Testing of wiring installations</p> <p>30. Common faults in wiring installations, their causes and remedies</p> <p>31. Earthing and methods of earthing</p> <p>32. Measurement of earth resistance</p> <p>33. Estimation of wiring materials</p> <p>34. Factory wiring and domestic wiring</p> <p>Unit/Monthly assignment</p>	<p>14. Stair case with extension wiring in Batten</p> <p>15. Domestic wiring with ICEPs LP socket in Batten</p> <p>16. Three L/P using D/B, M/S, EM, Tunnel wiring 4 points in Batten</p> <p>Unit / Monthly assignment</p>
5	<p><b>CELLS AND BATTERIES</b></p> <p>35. Electrolysis and laws of electrolysis and electroplating</p> <p>36. Principle of primary cell &amp; simple voltaic cell</p> <p>37. Leclanche's cell and dry cell</p> <p>38. Weston standard cell</p> <p>39. Lead acid accumulators</p> <p>40. Defects in lead acid accumulators, causes and remedies</p> <p>41. Nickel iron cell</p> <p>42. Nickel cadmium cell</p> <p>43. Methods of Battery charging</p> <p>44. Grouping of cells</p> <p>45. Care and maintenance of batteries</p>	<p>17. Intermediate wiring in Batten</p> <p>18. Hostel wiring for three points in Batten</p> <p>19. Testing of wiring installation Preparation of electrolyte measurement of cell voltage, gravity and precautions required.</p>
6	<p><b>D.C. GENERATOR</b></p> <p>46. Principles of D.C. Generator and e.m.f. induced equation</p> <p>47. Parts of D.C. Generator</p> <p>48. Types of D.C. Generators, separately excited generator</p> <p>49. D.C. Shunt generator, characteristics &amp; uses</p> <p>50. D.C. series generator, characteristics &amp; uses</p> <p>51. D.C. Compound generator, characteristics and uses</p> <p>52. Armature reaction in DC. Generator</p> <p>53. Commutation</p> <p>54. Voltage regulation of D.C. Generator</p> <p>55. Parallel operation of D.C. Generator</p>	<p>20. Making a conduit frame</p> <p>21. Wiring of Two L/P in conduits Types of carbon brushes and the importance of brush bedding and pressure</p>

7	<p style="text-align: center;"><b>D.C. MOTORS</b></p> <p>56. Principles of D.C. Motor                      57. Types of D.C. motors, shunt motor, characteristics and uses                      58. D.C. Series motor, characteristics and uses                      59. D.C. compound motor, characteristics and uses                      60. Starting of series motor, series motor starters                      61. Starters for D.C. shunt motors, compound motors</p>	<p>22. Power wiring for 3 phase motor with I.C.T.P. and starter                      23. Power wiring for 3 phase motor with IC.T.P. starter</p>
8	<p>62. Speed controls of D.C. motors                      63. Ward Leonard method – D.C. Drives                      64. Losses and efficiency of D.C. Machines                      65. Testing of D.C. Machines                      66. Faults in D.C. machines, causes and remedies                      67. Care and maintenance of D.C. machines                      Principles of stepped motor and servo motor</p> <p style="text-align: center;">Unit / Monthly assignment</p>	<p style="text-align: center;"><b>D.C. MOTORS</b></p> <p>24. Identification of terminals of D.C. machine                      25. Building of voltage in shunt and compound generator.                      26. Open circuit characteristics of D.C. shunt generator                      27. Load characteristics of shunt generator                      28. Open circuit and load characteristics of compound generator</p> <p style="text-align: center;">Unit / Monthly Test / Assignment</p>
9	<p style="text-align: center;"><b>A.C. FUNDAMENTALS</b></p> <p>68. A.C. Fundamentals, terms and their definitions                      69. Addition and subtraction of vector quantities                      70. Pure circuits (resistive, inductive, capacitive)                      71. Power and power factor in A.C. circuits                      72. A.C. series circuit                      73. A.C. Parallel circuit                      74. Branched circuits                      75. Resonance circuit                      76. Polyphase systems                      77. Polyphase circuits                      78. Power measurement in poly phase circuits                      79. Effects of poor power factor and its improvement</p>	<p>29. Starting, running and reversing the D.O.R. OF d.c. shunt motor using 3 point starters                      30. Starting, running and reversing the D.O.R. of compound motor using 4 point starter.                      31. Speed control of d.c. compound motor by voltage control and Flux control method                      32. Testing of D.C. machines</p>

10	<p style="text-align: center;"><b>TRANSFORMERS</b></p> <p>80. Principles types and construction of transformers              81. E.M.F. equation              82. Loading of transformers              83. Losses and efficiency of transformers              84. Ratings and regulation of transformers              85. All day efficiency of transformers              86. Auto transformers              87. Instrument transformers</p>	<p>33. Study on DOL, star-Delta and Auto star delta starter              34. Study on starter for slip ring induction motor              35. Study on Auto transformer starters              36. Identification of terminals of 3 phase inductor motor, start run and reverse the D.O.R. of the motor with D.O.L. starters              37. Connection of 3 phase inductor motor with star delta and auto star delta starters.</p>
11	<p>88. Three phase transformers              89. Connection of three phase transformer              90. Testing of transformer              91. Parallel operation of transformer              92. Tap changing in transformer              93. Cooling of transformer              94. Care and maintenance of transformers</p>	<p>38. To find out Transformation ratio and regulation of a single phase transformer.              39. To find losses and efficiency of Transformer              40. Parallel operation of Transformer</p>
12	<p style="text-align: center;"><b>A.C. THREE PHASE INDUCTION MOTORS</b></p> <p>95. Principle and construction of induction motors and their types              96. Induction motors – characteristics and uses              97. A.C. motor starters              98. Speed control of three phase induction motor – VVVF control              99. Trouble shooting, care and maintenance of 3 phase induction motors</p> <p style="text-align: center;"><b>A.C. SINGLE PHASE MOTORS</b></p> <p>100.Principles, types and construction of single phase motors.              101.Capacitor motors, types and applications              102.Speed control of single phase motor, solid state control.</p> <p style="text-align: center;"><b>PREFINAL TEST</b></p>	<p>41. Connection and testing of Single phase motors              42. Overhauling of single phase motor. Introduction to electrical circuits of general machines. (presses, Notching machine etc.,</p> <p>Review on trade practicals based on question papers.</p> <p style="text-align: center;"><b>PRE FINAL TEST</b></p>

NOTE : All tools and equipments as per CTS of NCVT

**DRAFT DESIGNED SYLLABUS FOR “WIREMAN”**

**TRADE TECHNOLOGY –II MODULE (CITS) : DURATION :3 MONTHS (12 WEEKS)**

Wk No.	Trade Theory Morning Session (09-00 a.m. to 12 Noon)	Practicals Afternoon Session (12-30 pm to 5-30 pm)
1	<b>ALTERNATORS</b> 1. Types and construction of alternators 2. E.M.F. equation of alternators 3. Armature reaction in alternators 4. Characteristics of alternators 5. Voltage regulation of alternator 6. Synchronizing of alternators 7. Cooling of alternators	Verification of Ohm’s law Measurement of resistance by drop method D.C. circuits – characteristics – series – parallel Combined circuit verification
2	<b>SYNCHRONOUS MOTORS</b> 8. Principle of synchronous motors 9. Starting of synchronous motors 10. Loading of synchronous motors 11. Typical varieties 12. Effect of field excitation on synchronous motor 13. Synchronous condensers	A.C. circuit characteristics series circuit containing RL & C Measurement of Power in single phase a.c. circuit Measurement of power in 3 phase a.c. circuit Measuring energy in d.c. and a.c. circuit
3	<b>WINDING</b> 14. Winding terminology 15. Winding insulation materials 16. Lap winding 17. Wave winding 18. Testing of D.C. armatures 19. Types of three phase winding 20. Procedure for rewinding the machines for same condition 21. Un-balanced windings 22. Re-connecting for change in frequency volt and speed 23. Testing of stator winding for its faults 24. Single phase winding	Study on 3 phase Alternator to identify different parts Connection and build up voltage in 3 phase Alternator Loading of Alternator and to find voltage regulator Parallel operation of 3 phase Alternator by lamp method and synchronous method

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4	25. Methods of resistance measurements 26. Loop tests 27. Classification of measuring instruments 28. Essential requirement of measuring instrument 29. Moving iron instrument 30. Moving coil instrument 31. Dynamo meter type instrument 32. Hot wire type instrument 33. Extension of ranges shunt, Multiplier <b>MONTHLY TEST</b>	Starting of synchronous motor Study on the effect of excitation on starter, armature, current, plotting of V curve
5	34. Watt meters 35. Energy meters 36. Power factor meters 37. Frequency meters 38. Meggar and Ohm meter 39. Methods of resistance measurements 40. Synchronoscope 41. Multimeter (Analog and Digital type) 42. Earth testing Megger	Testing of burnt motor Armature for re-winding, collection of data – Development of Armature winding diagram Preparation of coils, re-winding of armature Testing after re-winding of Armature
6	<b>GENERATION – TRANSMISSION &amp; DISTRIBUTION</b> 43. Generating stations 44. Generation & transmission voltage adopted in India 45. D.C. distribution system 46. A.C. distribution systems 47. Over head lines conductors and insulators 48. Over head lines supports 49. Over head line terminology 50. Lightning arresters – types, their construction and uses	Use of voltmeter, Ammeter, Wattmeter, Energy meter Calibration of single phase energy meter Extension of voltmeter and Ammeter ranges
7	51. Line controlling & protecting eqpts 52. Guards 53. Construction & terminology of U.G. cables 54. Faults and their remedies 55. Efficiency & regulation transmission lines	Measurement of insulation resistance of different machines by megger Use of Multimeter (analog type and Digital type) Measurement of Earth resistance by Earth Testing Megger

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8	<p><b>BASIC ELECTRONICS</b></p> <p>56. Semiconductor concept, semiconductor diode, transistor, amplifier, oscillator, their working principles and characteristics.</p> <p>57. Rectification process, single phase and 3 phase diode rectifier</p> <p>58. Power supply</p> <p>59. S.C.R. Triac, Diac &amp; UJT – their working principle and applications</p> <p>60. Study of PCB</p> <p><b>MONTHLY TEST</b></p>	<p>Demonstration, testing and use of line protecting devices as per I.E. Rules</p> <p>Demonstration, testing and use of line protection</p> <p>Study, removing of insulation and testing of underground cables</p> <p><b>MONTHLY TEST</b></p>
9	<p><b>LAMPS &amp; ILLUMINATION</b></p> <p>61. Illumination terminology</p> <p>62. Incandescent lamps</p> <p>63. Principle of discharge lamps</p> <p>64. Mercury vapour lamps</p> <p>65. Fluorescent lamps</p> <p>66. Sodium vapour lamps</p> <p>67. Neon signs</p> <p>68. Laws of illumination</p> <p>69. Systems of illumination and different</p>	<p>Tests and identification of legs of Diode, Transistors, SCR, UJT and FET</p> <p>Test on power supply</p> <p>Demonstration and tests on Transistor amplifier and oscillators.</p> <p>Study on Amplifier &amp; oscillator circuits.</p> <p>Study on PCB</p> <p>Study and operation of Oscilloscope</p>
10	<p><b>AUTOMOBILE WIRING</b></p> <p>70. Lighting and horn circuits in automobiles</p> <p>71. Lighting circuit</p> <p>72. Charging circuit</p> <p>73. Starting circuit</p> <p>74. Indicating devices and other electrical accessories used in automobiles</p>	<p>Connection of LPMV lamp HPMV lamps</p> <p>Twin tube light connection used in the Industry</p> <p>Study and connection of Sodium Vapour lamp</p> <p>Study and connection of CFL</p> <p>Study and connection of Hallogen lamp</p>
11	<p><b>WORK STUDY</b></p> <p>75. Inspection, scrap production by stage inspection</p> <p>76. Work simplification</p> <p>77. Job analysis and planning at job</p> <p>78. Estimation of time and material</p> <p>79. Job handling</p>	<p>Study on lighting circuit of a vehicle</p> <p>Study on ignition circuit and charging circuit</p>
12	<p>Review on Question papers /</p> <p>Industrial Visit /</p> <p>Project work/</p> <p><b>PREFINAL TESTS</b></p>	<p>Review on trade practicals /</p> <p>Industrial visit / Project work</p> <p><b>PRE FINAL TEST</b></p>

NOTE ; Tools & Equipments as per the C.T.S./A.T.S. OF NCVT