



GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

WIREMAN

(Duration: Two Years)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – POWER









WIREMAN

(Engineering Trade)

(Revised in 2015)

Version: 1.1

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 5

Skill India कौशल भारत-कुशल भारत

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

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The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

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During the two-year duration of Wireman trade a candidate is trained on professional skill, professional knowledge, Engineering Drawing, Workshop Calculation & Science and Employability skill. In addition to this a candidate is entrusted to undertake project work and extracurricular activities to build up confidence. The broad components covered under Professional Skill subject are as below:-

First Year: In this year, the trainee learns about safety and environment, use of fire extinguishers, artificial respiratory resuscitation to begin with. He gets the idea of planning & preparing good quality electrical wire joints for single and multi stand conductors suitable for applications with soldering and taking suitable care and safety. The trainee will be able to draw and set up DC and AC circuits including R-L-C circuits with accurate measurement of voltage, current, resistance, power, power factor and energy using ammeter, voltmeter, ohm-meter, watt-meter, energy meter, power factor meter and phase sequence tester with proper care and safety, plan, draw, estimate material, wire up and test different type of domestic wiring circuits as per Indian Electricity rules and taking care of quality, Construction and working of MCB & ELCB. Test a domestic wiring installation using Megger. The trainee will identify the type of batteries, construction, working and application of Ni-cadmium, lithium cell, lead acid cell etc. Demonstrate their charging and discharging, choosing appropriate method and carryout the installation and routine maintenance with due care and safety. He will plan & select to carry out basic jobs of marking out the components for filing, drilling, and riveting, fitting and assembled using different components independently, plan and install Pipe & Plate earthing. Measure earth resistance by earth tester, select and perform electrical/ electronic measurements with appropriate instrument. He should plan and execute electrical illumination system viz. FL tube, HPMV lamp, HPSV lamp, Halogen & metal halide lamp, CFL, LED lamp etc., plan, draw, estimate material, wire up and test different type of industrial wiring circuits as per Indian Electricity rules and taking care of quality. He will be able to plan, draw, estimate material, wire up and test different type of commercial and computer networking wiring circuits as per Indian Electricity rules and taking care of quality.

Second Year: In this year, the trainee will learn to construct and test Half—wave, full-wave, and bridge rectifiers with filter & without filter. He will be able to identify the constructional features, working principles of DC machine. Starting with suitable starter, running, forward and reverse operation and speed control of DC motors. Conduct the load performance test of DC machine with due care and safety. Maintain and troubleshoot of DC machines. He will recognise the constructional features, working principles of single phase and 3 phase AC motors. Starting with suitable starter, running, forward and reverse operation and speed control of AC motors with due care and safety. He should be able to identify the constructional



features, working principles of Alternator set. Test, Wire-up and run alternator. Synchronization of Alternator with due care and safety, identify the types, constructional features, working principles of transformer (single & three phase) Connect and test Transformer. He should be able to Prepare single line diagram and layout plan of electrical transmission & distribution systems and power plants with knowledge of principle applied. Make and test power connection to substation equipments with care and safety. He will select, assemble, test and wire-up control panel, plan, estimate and costing of different types of wiring system as per Indian Electricity rule.





2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of Labour market. The vocational training programmes are running under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes under NCVT for propagating vocational training.

The Wireman trade under CTS is one of the most popular courses delivered nationwide through network of ITIs. The course is of two years duration. It mainly consists of Domain area and Core area. The Domain area (Trade Theory & Practical) imparts professional skills and knowledge, while Core area (Workshop Calculation science, Engineering Drawing and Employability Skills) imparts requisite core skill & knowledge and life skills. After passing out of the training programme, the trainee is awarded National Trade Certificate (NTC) by NCVT which is recognized worldwide.

Trainee broadly needs to demonstrate that they are able to:

- Read & interpret technical parameters/documentation, plan and organize work processes, identify necessary materials and tools;
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional knowledge, core skills & employability skills while performing the job, and repair & maintenance work.
- Check the job/ assembly as per drawing for functioning identify and rectify errors in job/ assembly.
- Document the technical parameters in tabulation sheet related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Can appear in 10th examination through National Institute of Open Schooling (NIOS) for acquiring high school certificate and can go further for General/ Technical education.
- Can join Apprenticeship programs in different types of industries leading to a National Apprenticeship certificate (NAC).
- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming an instructor in ITIs.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years: -

S No.	Course Element	Notional Training Hours
1	Professional Skill (Trade Practical)	2131
2	Professional Knowledge (Trade Theory)	498
3	Workshop Calculation & Science	166
4	Engineering Drawing	249
5	Employability Skills	110
6	Library & Extracurricular Activities	166
7	Project Work/Industrial Visit	480
8	Revision & Examination	360
	Total	4160

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the Government of India (GoI) from time to time. The employability skills will be tested in the first year itself.

- a) The **Formative Assessment** during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of Formative assessment will be as per the template (Annexure II).
- b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NTC will be conducted by NCVT as per the guideline of Government of India. The pattern and marking structure is being notified by Govt. of India from time to time. The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final examination will also check the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

For the purposes of determining the overall result, weightage of 100% is applied for six months and one year duration courses and 50% weightage is applied to each examination for two years courses. The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects is 33%.



2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure, behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of Formative assessments are to be preserved until forthcoming examination for audit and verification by examining body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence			
(a) Weightage in the range of 60%-75% to be allotted during assessment				
For performance in this grade, the candidate should produce work which demonstrate attainment of an acceptable standard or craftsmanship with occasional guidance, and due regard for safety procedures an practices	hand tools, machine tools and workshop equipment. • 60-70% accuracy achieved while			
(b) Weightage in the range of 75%-90% to be allotted during assessment				
For this grade, a candidate should product work which demonstrates attainment of reasonable standard of craftsmanship, wit little guidance, and regard for safet procedures and practices	machine tools and workshop equipment. • 70-80% accuracy achieved while			



- A good level of neatness and consistency in the finish.
- Little support in completing the project/job.

(c) Weightage in the range of more than 90% to be allotted during assessment

For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.

- High skill levels in the use of hand tools, machine tools and workshop equipment.
- Above 80% accuracy achieved while undertaking different work with those demanded by the component/job.
- A high level of neatness and consistency in the finish.
- Minimal or no support in completing the project.





Brief description of job role:

Wireman, Light and Power; installs various kinds of electrical wiring such as cleat, conduit, casing, concealed etc. in houses, factories, workshops and other establishments for light and power supply. Studies diagram and plan of wiring and marks light, power and other points accordingly. Fixes wooden pegs, sizes tubes, saws casings, etc. by common carpentry fitting and other processes, according to type of wiring needed. Erects switch boards and fixes switch box casings cleats, conduits ceiling roses, switches, meters etc. according to type and plan of wiring. Draws wire in two way or three-way wiring system as prescribed and makes electrical connections through plugs and switches to different points exercising great care for safety and avoiding short circuit and earthing at any stage of wiring. Fixes fuses and covers as per diagram and insulates all naked wires at diversions and junctions to eliminate chances of short circuit and earthing. Fits light brackets, holders, shades, tube and mercury lights, fans etc, and makes electrical connection as necessary. Tests checks installed wiring for leakage and continuity using megger, removes faults if any and certifies wiring as correct for connecting mains. Checks existing wiring for defects and restores current supply by replacing defective switches, plug sockets, blown fuse etc. or removing short circuits and faulty wiring as necessary. May repair simple electrical domestic appliances.

Reference NCO-2015: 7411.0301 - Wireman, Light and Power





Name of the Trade	Wireman		
NCO - 2015			
	7411.0301		
NSQF Level	Level-4		
Duration of Craftsmen Training	Two Years		
Entry Qualification	Passed 8 th class examination		
Unit Strength (No. Of Students)	20		
Space Norms	88 Sq. m		
Power Norms	5 KW		
Instructors Qualification			
1. Wireman Trade	Degree in Electrical/ Electrical and Electronics Engineering from recognized Engineering College/ university with one year experience in the relevant field. OR Diploma in Electrical / Electrical and Electronics Engineering from recognized board of technical education with two years experience in the relevant field. OR NTC/NAC passed in the Trade of Electrician/ Wireman with three years' post qualification experience in the relevant field and one year Craftsman instructor training under CITS in 'Wireman' trade. Essential Qualification: Craft Instructor Certificate in relevant trade under NCVT. Out of two Instructors required for the unit of 2(1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.		
2. Workshop	Degree in Engineering with one year experience.		
Calculation & Science	OR		
	Diploma in Engineering with two-year experience. Essential Qualification: Craft Instructor Certificate in RoD&A course under NCVT.		
3. Engineering	Degree in Engineering with one year experience.		
Drawing	OR		
	Diploma in Engineering with two-year experience.		



		OR NTC/ NAC passed in the Draughtsman (Mechanical/ Civil) with three- year experience.				
		Essential Qualif		ROD & A course	a under NCVT	
4. Employability Skill List of Tools and		Craft Instructor Certificate in RoD & A course under NCVT. MBA OR BBA with two-year experience OR Graduate in Sociology/ Social Welfare/ Economics with two-year experience OR Graduate/ Diploma with two-year experience and trained in Employability Skills from DGT institutes. AND Must have studied English/ Communication Skills and Basic Computer at 12th/ Diploma level and above. OR Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes As per Annexure – I				
Equipment Distribution of training o				<i>'</i>)		
Total Hours Trade /Week Practical		Trade Theory	Workshop Cal. &Sc.	Engg. Drawing	Employability Skills	Extra- curricular activity
40 Hours	25 Hours	6 Hours	2 Hours	3 Hours	2 Hours	2 Hours





NSQF level for 'Wireman' trade under CTS: Level 4.

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

- a. Process
- b. Professional knowledge
- c. Professional skill
- d. Core skill
- e. Responsibility

The Broad Learning outcome of 'Wireman' trade under CTS mostly matches with the Level descriptor at Level-4.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice	Factual knowledge of field of knowledge or study	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	Language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment	Responsibility for own work and learning



Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

6.1 GENERIC LEARNING OUTCOME

- 1. Recognize & comply safe working practices, environment regulation and housekeeping.
- 2. Work in a team, understand and practice soft skills, technical English to communicate with required clarity.
- 3. Demonstrate knowledge of concept and principles of basic arithmetic, algebraic, trigonometric and apply knowledge of specific area to perform practical operations.
- 4. Understand and explain basic science in the field of study including friction, simple machine and heat and temperature.
- 5. Read and apply engineering drawing for different application in the field of work.
- 6. Understand and explain the concept in productivity, quality tools and labour welfare legislation and apply such in day to day work to improve productivity & quality.
- 7. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
- 8. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
- 9. Understand and apply basic computer working, basic operating system and uses internet services to get accustomed & take benefit of IT developments in the industry.

6.2 SPECIFIC LEARNING OUTCOME

FIRST YEAR

- 10. Make good quality electrical wire joints for single and multi strand conductors suitable for applications with soldering and taking suitable care and safety.
- 11. Draw and set up DC and AC circuits including R-L-C circuits with accurate measurement of voltage, current, resistance, power, power factor and energy using ammeter, voltmeter, ohm-meter, watt-meter, energy meter, power factor meter and phase sequence tester with proper care and safety.
- 12. Plan, draw, estimate material, wire up and test different type of domestic wiring circuits as per Indian Electricity rules and taking care of quality. Construction and working of MCB & ELCB. Test a domestic wiring installation using Megger.
- 13. Identify the type of batteries, construction, working and application of Ni-cadmium, lithium cell, lead acid cell etc. Demonstrate their charging and discharging, choosing appropriate method and carryout the installation and routine maintenance with due care and safety.
- 14. Make choices to carry out basic jobs of marking out the components for filing, drilling, and riveting, fitting and assembled using different components independently.



- 15. Plan and install Pipe & Plate earthing. Measure earth resistance by earth tester.
- 16. Select and perform electrical/ electronic measurements with appropriate instrument.
- 17. Plan and execute electrical illumination system viz. FL tube, HPMV lamp, HPSV lamp, Halogen & metal halide lamp, CFL, LED lamp etc.
- 18. Plan, draw, estimate material, wire up and test different type of industrial wiring circuits as per Indian Electricity rules and taking care of quality.
- 19. Plan, draw, estimate material, wire up and test different type of commercial and computer networking wiring circuits as per Indian Electricity rules and taking care of quality.

SECOND YEAR

- 20. Construct and test Half—wave, full-wave, and bridge rectifiers with filter & without filter. Troubleshoot and service of DC regulated power supply.
- 21. Understand the constructional features, working principles of DC machine. Starting with suitable starter, running, forward and reverse operation and speed control of DC motors. Conduct the load performance test of DC machine with due care and safety. Maintain and troubleshoot of DC machines.
- 22. Understand the constructional features, working principles of single phase and 3 phase AC motors. Starting with suitable starter, running, forward and reverse operation and speed control of AC motors with due care and safety.
- 23. Understand the constructional features, working principles of Alternator set. Test, Wire-up and run alternator. Synchronization of Alternator with due care and safety.
- 24. Understand the types, constructional features, working principles of transformer (single & three phase) Connect and test Transformer.
- 25. Prepare single line diagram and layout plan of electrical transmission & distribution systems and power plants with knowledge of principle applied. Make and test power connection to substation equipments with care and safety.
- 26. Select, assemble, test and wire-up control panel.
- 27. Plan, estimate and costing of different types of wiring system as per Indian Electricity rule.



7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME			
LEARNING OUTCOME	ASSESSMENT CRITERIA		
Recognize & comply safe working practices environment regulation and housekeeping.	environment in line with occupational health and		
2. Interpret & use company and technica communication.			



	 2.5 Present facts and circumstances, possible solutions & use English special terminology. 2.6 Resolve disputes within the team 2.7 Conduct written communication.
3. Demonstrate knowledge of concept and principles of basic arithmetic, algebraic, trigonometric, and statistics and apply knowledge of specific area to perform practical operations.	 3.1 Yearly examination to test basic skills on arithmetic, algebra, trigonometry and statistics. 3.2 Their applications will also be assessed during execution of assessable outcome and also tested during theory and practical examination.
4. Understand and explain basic science in the field of study including friction, simple machine and heat and temperature.	 4.1 Yearly examination to test basic skills on science in the field of study including friction, simple machine and heat and temperature. 4.2 Their applications will also be assessed during execution of assessable outcome and also tested during theory and practical examination.
5. Read and apply engineering drawing for different application in the field of work.	5.1 Yearly examination to test basic skills on engineering drawing.5.2 Their applications will also be assessed during execution of assessable outcome and also tested during theory and practical examination.
6. Understand and explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.	 6.1 Yearly examination to test the concept in productivity, quality tools and labour welfare legislation. 6.2 Their applications will also be assessed during execution of assessable outcome.
7. Explain energy	7.1 Yearly examination to test knowledge on energy conservation, global warming and pollution.



	conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	7.2 Their applications will also be assessed during execution of assessable outcome.
8.	Explain personnel finance,	8.1 Yearly examination to test knowledge on personnel finance, entrepreneurship.
	entrepreneurship and manage/organize	8.2 Their applications will also be assessed during execution of assessable outcome.
	related task in day to	
	day work for personal &	
	societal growth.	
9.	Understand and apply basic computer	9.1 Yearly examination to test knowledge on basic computer working, basic operating system and uses internet services.
	working, basic operating system and	9.2 Their applications will also be assessed during execution of assessable outcome.
	uses internet services to get accustomed & take	ATTENDED TO THE PARTY OF THE PA
	benefit of IT	
	developments in the industry.	all books

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SPECIFIC LEARNING OUTCOMES				
LEARNING OUTCOME	ASSESSMENT CRITERIA			
	FIRST YEAR			
10. Make good quality electrical wire joints for single and multi strand conductors suitable for applications with soldering and taking suitable care and safety.	 10.1 Observe safety/ precaution during joints & soldering. 10.2 Make simple straight twist and rat-tail joints in single strand conductors. 10.3 Make married and 'T' (Tee) joint in stranded conductors. 10.4 Prepare a Britannia straight and 'T' (Tee) joint in bare conductors. 10.5 Prepare western union joint in bare conductor. 10.6 Solder the finished copper conductor joints with precaution. 10.7 Prepare termination of cable lugs by using crimping tool. 			
11. Draw and set up DC and AC circuits including R-L-C circuits with accurate measurement of voltage, current, resistance, power, power factor and energy using ammeter, voltmeter, ohmmeter, watt-meter, energy meter, power factor meter and phase sequence tester with proper care and safety.	 11.1 Identify types of wires, cables and verify their specifications. 11.2 Verify the characteristics of series, parallel and its combination circuit. 11.3 Analyze the effect of the short and open in series and parallel circuits. 11.4 Verify the relation of voltage components of R.L.C. series circuit in AC. 11.5 Determine the power factor by direct and indirect methods in an AC single phase R, L, C parallel circuit. 11.6 Identify the phase sequence of a 3 ø supply using a phase- sequence meter. 11.7 Prepare / connect a lamp load in star and delta and determine relationship between line and phase values with precaution. 11.8 Connect balanced and unbalanced loads in 3 phase star system and measure the power of 3 phase loads with safety/ precaution. 			
12. Plan, draw, estimate material, wire up, test different type of domestic wiring circuits as per Indian Electricity rules and taking care of quality. Construction and working of MCB & ELCB. Test a domestic wiring installation using Megger.	 12.1 Comply with safety & IE rules when performing the domestic wiring. 12.2 Identify the parts of MCB & ELCB and test its operation. 12.3 Identify the types of fuses their ratings and applications. 12.4 Prepare and mount the energy meter board with due care. 12.5 Draw and wire up the consumers main board with ICDP switch and distribution fuse box. 12.6 Draw and wire-up to control lamp controlled from 2 places (stair case wiring) on batten wiring as per IE rule. 12.7 Draw and wire-up single phase domestic pump set in PVC conduit wiring as per IE rule. 12.8 Draw and wire-up in casing capping one lamp controlled 			



		from 3 different places using intermediate switch as per IE rule.
	12.9	Wire –up in PVC conduit wiring for calling bell/buzzer & test them.
	12.10	Estimate the material for wiring in PVC casing & capping
		for two lamps, one fan and one 6A socket outlet & wire-
		up.
	12.11	Test a domestic wiring installation by using Megger.
13. Identify the type of batteries,	13.1	Assemble a DC source 6V/500 mA using 1.5V cells.
construction, working and	13.2	Determine the Formative resistance of cell and make
application of Ni-cadmium,		grouping of cells.
lithium cell, lead acid cell etc. Demonstrate their charging	13.3	Identify the parts of a battery charger and test for its operation.
and discharging, choosing	13.4	Practice on charging of battery and test for its condition with safety/ precaution.
appropriate method and	13.5	Installation and maintenance of batteries.
carryout the installation and routine maintenance with due	13.6	Maintain, service and troubleshoot a battery charger.
care and safety.	1 7	2X. XV
14. Make choices to carry out	14.1	Identify the trade hand tools; practice their uses with
basic jobs of marking out the		safety, care & maintenance.
components for filing, drilling,	14.2	Prepare a simple half lap joint using firmer chisel with
and riveting, fitting and	440	safety.
assembled using different	14.3	Prepare tray using sheet metal with the safety
components independently.	14.4	Practice on fixing surface mounting type of accessories.
	14.5 14.6	Practice on connecting of electrical accessories. Make and wire up of a test board and test it.
	14.0	Make and whe up of a test board and test it.
15 Dlan and install Ding & Dlate	15 1	Measure soil conductivity
15. Plan and install Pipe & Plate		Install the pipe earthing and test it.
earthing. Measure earth		Install the plate earthing and test it.
resistance by earth tester.		Measure the earth electrode resistance using earth
		tester.
	15.5	Carry out earth resistance improvement.
		·
16. Select and perform electrical/	16.1	Identify the type of electrical instruments.
electronic measurements with	16.2	Determine the measurement errors while measuring
appropriate instrument.		resistance by voltage drop method.
Spp. Sp. 1800 mondification	16.3	Extend the range of MC voltmeter and ammeter.
	16.4	Measure the power and energy in a single & three phase
		circuit using wattmeter and energy meter with CT and PT.
		Test single phase energy meter for its errors.
	16.6	Measure the value of resistance, voltage and current using digital multimeter.
	16.7	Measure the power factor in poly-phase circuit and verify the same with voltmeter, ammeter, wattmeter readings.



	16.8	Calibrate analog instruments.				
	16.9 Measure frequency by frequency meter.					
	16.10 Use meggar for insulation testing					
17. Plan and execute electrical illumination system viz. FL	17.1	Install light fitting with reflectors for direct and indirect lighting.				
•	17.2	Assemble and connect a & single twin tube F.L.				
tube, HPMV lamp, HPSV lamp,	17.3	Connect, install and test the H.P.M.V, H.P.S.V, Halogen &				
Halogen & metal halide lamp,	17.5	metal hallide lamp with accessories.				
CFL, LED lamp etc.	17.4	Prepare and test a decorative serial lamp set for 190 V				
		using 6V bulb and flasher.				
	17.5	Connect the neon sign with the accessories and test it.				
	17.6	Assemble and install solar photo voltaic light.				
	17.7	Install light fitting for show case window lighting.				
	17.8	Install & test CFL & LED lamps.				
	17.9	Measure intensity of light using LUX Meter.				
		, 5				
18. Plan, draw, estimate material,	18.1	Comply with safety & IE rules when performing the				
wire up, test different type of		Industrial wiring.				
industrial wiring circuits as per	18.2	Wire-up PVC Conduit wiring for lighting circuit & 3 phase				
Indian Electricity rules and		motor circuit with due care and safety.				
·	18.3	Estimate the material required for the given layout for				
taking care of quality.		metal conduit wiring for 3 phase 3 HP squirrel cage				
	66	induction motor & wire-up as per IE rule.				
	18.4	Make termination to the feeder cable in bus bar & to				
	- 4	service cable through plug-in box with due care and				
		safety.				
	18.5	Erect a bus bar chamber on an angle iron board and wire-				
		up for 3 phase induction motor with due care and safety.				
	18.6	Determine the size of cable for main & distribution board				
		of a workshop.				
	18.7	Test an industrial wiring installation by using Megger.				
19. Plan, draw, estimate material,	19.1	Estimate the material for PVC channel wiring for				
wire up and test different type		telephone intercom having 5 instruments from main				
of commercial and computer		distribution frame (MDF) with due care.				
networking wiring circuits as	19.2	Estimate the material and wire-up PVC concealed conduit				
per Indian Electricity rules and		wiring of three phase installation of 3 stores office				
taking care of quality.		building having 4 lamps, 2 fans, one 5 A socket outlet and				
0 3 3 4 4 4		one buzzer in each room with ELCB protection as per IE				
	10.2	rule.				
	19.3	Draw and wire up a bank/hostel/hospital/commercial establishment in PVC conduit as per IE rule.				
	19.4	Test a commercial wiring installation by using Megger.				
	19.4	Wire up and test LAN wiring with due care.				
	19.5	Install co axial cable from dish antenna to Television set.				
	19.7	Prepare and connect batteries with UPS with due care				
	13./	and safety.				
		ana sarcty.				



	19.8	Install and test UPS in the circuit with due care and safety.
		SECOND YEAR
20. Construct and test Half-wave, full-wave, and bridge rectifiers with filter & without filter.	20.1	Practice soldering of components. Identify passive /active components by visual appearance, Code number and test for their condition.
Trouble shoot and service of DC regulated power supply.	20.3	rectifiers with and without filter circuits.
J,	20.4	Identify the control and functional switches in CRO and measure the D.C. / A.C. voltage, frequency and time period.
	20.5	Identify the parts, trouble shoot & service a DC regulated power supply.
	24 4	
21. Understand the constructional features, working principles of	21.1	Plan work in compliance with standard safety norms related with DC machines.
DC machine. Starting with suitable starter, running,	21.2	Identify the parts of DC machine and measure armature & field resistances and insulation resistance.
forward and reverse operation	21.3	Connect a DC generator, build up the voltage & load with proper safety.
and speed control of DC motors. Conduct the load	21.4	
performance test of DC machine with due care and	21.5	Connect the DC motor through 2/3/4 point starter, run, adjust the speed & change direction of rotation.
safety. Maintain and troubleshoot of DC machines.	21.6	Troubleshoot & maintain a DC machine.
22. Understand the constructional features, working principles of	22.1	Plan work in compliance with standard safety norms related with AC motors.
single phase and 3 phase AC motors. Starting with suitable	22.2	Connect start, run and reverse the DOR of different type of single phase motors.
starter, running, forward and reverse operation and speed control of AC motors with due	22.3	Identify the terminals of 3 phase squirrel cage induction motor, wire up, run using different types of starters and change the direction of rotation.
care and safety.	22.4	Determine the efficiency of 3 phase squirrel cage induction motor by no load test/ blocked rotor test and brake test.
	22.5	Wire up, start, run and adjust the speed of a slip-ring induction motor.
	22.6	Construct DOL, Forward/Reverse starter circuits using push button switches, contactors, overload relays etc.
	22.7	Practice power connections to motors.
23. Understand the constructional features,	23.1	Plan work in compliance with standard safety norms related with Alternator.
working principles of	23.2	Identify the parts of an Alternator, measure armature & field resistances and insulation resistance.



Alternator set. Test, Wire-up	23.3	Wire-up, start and run an alternator and build up the voltage.
and run alternator.	23.4	Load the Alternator & find out regulation at different
Synchronization of Alternator	23.4	loads.
with due care and safety.	23.5	Synchronise the Alternators with mains.
	23.5	Synchronise the Atternators with mains.
24 Understand the types	24.1	Plan work in compliance with standard safety norms
24. Understand the types,	24.1	related with transformer.
constructional features,	24.2	Identify the types of transformers and their
working principles of	27.2	specifications.
transformer (single & three	24.3	Measure winding resistance & Insulation resistance of
phase) Connect and test		single phase & 3 phase transformer.
Transformer.	24.4	Identify the terminals; verify the transformation ratio of a
		single phase and 3 phase transformer.
	24.5	Connect and test a single phase auto- transformer.
	24.6	Determine the losses (iron loss and copper loss) efficiency
		and regulation of a single phase transformer at different
		loads.
	24.7	Connect transformers in parallel.
25. Prepare single line diagram	25.1	Plan work in compliance with standard safety norms
and layout plan of electrical		related with substation & over head lines.
transmission & distribution	25.2	Prepare layout plan, single line diagram of different type
systems and power plants with	-66	of power plant and project report of all equipment's and
knowledge of principle		machineries of the visited plant.
applied. Make and test power	25.3	Prepare single line diagram of the institute's electrical
connection to substation		substation & distribution system.
equipments with care and	25.4	Demonstrate testing and use of line protecting devices as
safety.	25.5	per IE rules.
Surety.	25.5 25.6	Make power connection to substation equipments.
	25.0	Identify the parts of substation equipments like circuit breakers and operate them.
	25.7	Practice crimping of lugs to underground cable and
	23.7	connect the cable to bus bars & equipments with due
		care.
	25.8	Start the generator, build up voltage and synchronise
		with mains by observing due care and safety.
	•	, 3
26. Select, assemble, test and	26.1	Draw the layout diagram of 3 phase AC motor control
wire-up control panel wiring.		cabinet.
and appearance bounce mining.	26.2	Mount the control elements and wiring accessories on
		the control panel.
	26.3	Practice wiring the control cabinet for local and remote
		control of induction motor.
	26.4	Draw and wire up the control panel for forward/ reverse
		operation of induction motor.
	26.5	Test the control panel for all the required logics.



27. Plan, estimate and costing of different types of wiring	27.1	Prepare layout and wiring diagram of domestic, commercial and industrial installation using IER symbols.
system as per Indian Electricity rule.	27.2	Record the various electrical wiring accessories available in market with price list and compare it.
ruic.	27.3	Plan, Estimate and Costing of Domestic wiring as per layout.
	27.4	Plan, Estimate and Costing of commercial wiring as per layout.
	27.5	Plan, Estimate and Costing of Industrial wiring as per layout.
		,





SYLLABUS FOR WIREMAN TRADE FIRST YEAR Professional Skills Week **Reference Learning Professional Knowledge** (Trade Practical) No. **Outcome** (Trade Theory) **With Indicative Hours** 1 Recognize & comply Implementation in the shop Occupational Safety & Health safe working floor of the various Basic safety introduction, Personal safety measures. (2 hrs.) protection:practices, environment Visit to the different sections Basic injury prevention, Basic first regulation of the Institute. (3 hrs.) aid, Hazard identification and and housekeeping. Demonstration on elementary avoidance, safety signs for Danger, first aid. Artificial Respiration. Warning, caution & personal (2 hrs.) safety message. Practice on use Use of Fire extinguishers. fire extinguishers. (3 hrs.) Visit & observation of sections. 5. Occupational Safety & Health Various safety measures involved Importance of housekeeping & in the Industry. good shop floor practices. (3 Concept of Standard hrs.) Health. Safety and **Soft Skills**: its importance and Job Environment guidelines, area after completion of training. legislations & regulations as Operation of electrical mains. applicable. Disposal procedure Introduction of PPEs. Introduction of waste materials like cotton to 5S concept & its application. waste, metal chips/burrs etc. Response to emergencies eg; (4 hrs.) power failure, fire, and system 7. Basic safety introduction, failure. Personal protective Equipment (PPE):- Basic injury prevention, Basic first aid. Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. (3 hrs.) Preventive measures for electrical accidents & steps to



			be taken in such accidents. (3	
			hrs.)	
2	Make good quality	9.	Demonstration of Trade hand	Identification of Trade-Hand tools-
	electrical wire joints		tools. (6 hrs.)	Specifications
	for single and multi	10.	Identification of simple types-	
	strand conductors		screws, nuts & bolts, chassis,	
	suitable for		clamps, rivets etc. (7 hrs.)	
	applications with	11.	Use, care & maintenance of	
	soldering and taking		various hand tools.	
	suitable care and		Familiarization with signs and	
	safety.		symbols of Electrical	
			accessories. (12 hrs.)	
3-4	-do-	12.	Practice in using cutting pliers,	Fundamental of electricity.
			screw drivers etc. skinning the	Electron theory- free electron,
			cables, and joint practice on	Fundamental terms, definitions,
			single strand. (20 hrs.)	units & effects of electric current
		13.	Demonstration & Practice on	
			bare conductors jointssuch as	
			rat tail, Britannia, straight, Tee,	
			Western union Joints. (30 hrs.)	
5	-do-	14.	Practice in soldering & brazing-	Solders, flux and soldering
		- 1	measurement of Resistant and	technique. Resistors types of
			measurement of specific	resistors & properties of resistors.
		N.	resistant. (15 hrs.)	A I CI
		15.	Application of Wheatstone	
		-	bridge in measurement of	17777
			resistance. (10 hrs.)	MIKO
6	Draw and set up DC	16.	Demonstration and	Introduction of National Electrical
	and AC circuits		identification of types of	,
	including R-L-C circuits		cables. (6 hrs.)	and properties of conductors,
	with accurate	17.	Demonstration & practice on	
	measurement of		using standard wire gauge &	Voltage grading of different types
	voltage, current,	_	micrometer. (6 hrs.)	of Insulators, Temp. Rise
	resistance, power,	18.	Practice on crimping thimbles,	permissible
	power factor and		Lugs. (5 hrs.)	Types of wires & cables standard
	energy using	19.	Examination and checking of	wire gauge Specification of wires &
	ammeter, voltmeter,		cables and conductors and	Cables-insulation & voltage grades
	ohm-meter, watt-		verification of materials	-Low , medium & high voltage
	meter, energy meter,		according to the span. (8 hrs.)	Precautions in using various types



	power factor meter			of cables / Ferrules
	and phase sequence			
	tester with proper			
	care and safety.			
7	-do-	20.	Verification of Ohm's Law. (2	Ohm's Law -
			hrs.)	Simple electrical circuits and
		21.	Verification of Kirchhoff's	problems. Reading of simple
			Laws. (3 hrs.)	Electrical Layout.
		22.	Verification of laws of series	Resistors -Law of Resistance. Series
			and parallel circuits. (4 hrs.)	and parallel circuits.
		23.	Verification of open circuit and	Kirchhoff's Laws and applications.
			closed circuit network. (3 hrs.)	Wheatstone bridge principle and
		24.	Measuring unknown resistance	its applications.
			using Wheatstone bridge,	Effect of variation of temperature
			voltage drop method. (6 hrs.)	on resistance. Different methods of
		25.	Experiment to demonstrate	measuring the values of resistance
			the variation of resistance of a	
			metal with the change in	
			temperature. (7 hrs.)	
8	Plan, draw, estimate	26.	Practice on installation and	Common Electrical Accessories,
	material, wire up and		overhauling common	their specifications in line with NEC
	test different type of	- 1	electrical accessories as per	2011-Explanation of switches lamp
	domestic wiring		simple Electrical circuit /	holders, plugs and sockets.
	circuits as per Indian	k.	Layout. (10 hrs.)	Developments of domestic circuits,
	Electricity rules and	27.	Fixing of switches, holder plugs	Alarm & switches, with individual
	taking care of quality.	_	etc. in T.W. boards. (8 hrs.)	switches, Two way switch .Security
	Construction and	28.	Identification and use of	surveillance, Fire alarm, MCB,
	working of MCB &		wiring accessories concept of	ELCB, MCCB.
	ELCB. Test a domestic		switching. (7 hrs.)	
	wiring installation			
	using Megger.			
9	Identify the type of	29.	Assembly of Dry cell-	Chemical effect of electric current-
	batteries,		Electrodes-Electrolytes. (4 hrs.)	Principle of electrolysis. Faraday's
	construction, working	30.	Grouping of Dry cells for a	Law of electrolysis. Basic principles
	and application of Ni-		specified voltage and current,	of Electro-plating and Electro
	cadmium, lithium cell,		Ni cadmium & Lithium cell. (4	chemical equivalents. Explanation
	lead acid cell etc.		hrs.)	of Anodes and cathodes.
	Demonstrate their	31.	Practice on Battery Charging,	Lead acid cell-description,
	charging and		preparation of	methods of charging- Precautions



	discharging, choosing		battery charging. (4 hrs.)	to be taken & testing equipment,
	appropriate method	32.	Testing of cells, Installation of	Ni-cadmium & Lithium cell,
	and carryout the		batteries, Charging of batteries	Cathodic protection.
	installation and		by different methods. (8 hrs.)	Electroplating, Anodizing. Different
	routine maintenance	33.	Practice on Electroplating and	types of lead acid cells.
	with due care and		anodizing, Cathodic	
	safety.		protection. (5 hrs.)	
10	-do-	34.	Routine care & maintenance of	Rechargeable dry cell, description
			Batteries. (25 hrs.)	advantages and disadvantages.
				Care and maintenance of cells
				Grouping of cells of specified
				voltage & current, Sealed
				Maintenance free Batteries, Solar
			470.482	battery.
11	-do-	35.	Charging of a Lead acid cell,	Inverter, Battery Charger, UPS-
			filling of electrolytes- Testing	Principle of working. Lead Acid cell,
			of charging checking	general defects & remedies.
			of discharged and fully	Nickel Alkali Cell-description
			charged battery. (25 hrs.)	charging. Power & capacity of
				cells. Efficiency of cells.
12-13	Make choices to carry	36.	Marking use of chisels and	ALLIED TRADES:
	out basic jobs of	er 1	hacksaw on flats, sheet metal	Introduction of fitting trade. Safety
	marking out the		filing practice, filing true to	precautions to be observed
	components for filing,	k.	line. (26 hrs.)	Description of files, hammers,
	drilling, and riveting,	37.	Sawing and planning practice.	chisels hacksaw frames & blades-
	fitting and assembled	7	Practice in using firmer chisel	their specification & grades. Care
	using different			& maintenance of steel rule try
	components		joint. (24 hrs.)	square and files.
	independently.			Marking tools description & use.
				Description of carpenter's
				common hand tools such as saws
				planes, chisels mallet claw
				hammer, marking, dividing &
				holding tools-their care and
		22	B (III)	maintenance.
14	-do-	38.	Drilling practice in hand drilling	Types of drills description & drilling
			& power drilling machines.	machines, proper use, care and
			Grinding of drill bits. (8 hrs.)	maintenance.
		39.	Practice in using taps & dies,	Description of taps & dies, types in



			threading hexagonal & square	rivets & riveted joints.
			nuts etc. (8 hrs.)	Use of thread gauge.
		40.	Cutting external threads on	
			stud and on pipes, riveting	
			practice. (9 hrs.)	
15	-do-	41.	Practice in using snips, marking	Description of marking & cutting
			& cutting of straight & curved	tools such as snubs shears
			pieces in sheet metals. (6 hrs.)	punches & other
		42.	Bending the edges of sheets	tools like hammers, mallets etc.
			metals. (6 hrs.)	used by sheet metal workers.
		43.	Riveting practice in sheet	Types of soldering irons-their
			metal. Practice in making	proper uses.
			different joints in sheet metal	Use of different bench tools used
			in soldering the joints. (13	by sheet metal worker. Soldering
			hrs.)	materials, fluxes and process.
16-17	Draw and set up DC	44.	Trace the magnetic field. (8	Magnetism –
	and AC circuits		hrs.)	Classification of magnets, methods
	including R-L-C circuits	45.	Assembly / winding of a simple	of magnetising, magnetic
	with accurate		electro magnet. (12 hrs.)	materials. Properties, care and
	measurement of	46.	Use of magnetic compass. (6	maintenance.
	voltage, current,		hrs.)	Para and Diamagnetism and
	resistance, power,	47.	Identification of different	Ferro magnetic materials.
	power factor and		types of Capacitors. (10 hrs.)	Principle of electro-magnetism,
	energy using	k.		Maxwell's
	ammeter, voltmeter,	48.	Charging and discharging of	corkscrew rule, Fleming's left and
	ohm-meter, watt-	-	capacitor. (8 hrs.)	right hand rules,
	meter, energy meter,	49.	Testing of Capacitors using DC	Magnetic field of current carrying
	power factor meter		voltage and lamp. (6 hrs.)	conductors, loop and solenoid.
	and phase sequence			MMF, Flux density, reluctance.
	tester with proper			B.H. curve, Hysteresis, Eddy
	care and safety.			current. Principle of electro-
				magnetic Induction, Faraday's Law,
				Lenz's Law.
				Electrostatics: Capacitor- Different
				types, functions and uses.
18-19	-do-	50.	Determine the characteristics	Alternating Current -Comparison
			of RL, RC and RLC in A.C.	and Advantages D.C and A.C.
			Circuits both in series and	Related terms frequency
			parallel. (13 hrs.)	Instantaneous value, R.M.S. value



		51.	Experiment on poly phase	Average value, Peak factor, form
			circuits. (8 hrs.)	factor.
		52.	Current, voltage, power and	Generation of sine wave,
			power factor measurement in	phase and phase difference.
			single & poly- phase circuits.	Inductive and Capacitive reactance
			(15 hrs.)	Impedance (Z), power factor (p.f).
		53.	Measurement of energy in	Active and Reactive power, Simple
			single and poly-phase circuits.	problems on A.C. circuits, single
			(8 hrs.)	Phase and three-phase system etc.
		54.	Use of phase sequence meter.	Problems on A.C. circuits.
			(6 hrs.)	Power consumption in series and
				parallel, P.F. etc. Concept three-
			-6	phase Star and Delta connection.
			1 April 2000	Line and phase voltage, current
				and power in a 3 phase circuits
				with balanced and unbalanced
				load.
20	Plan and install Pipe	55.	Practice on Earthing -	Earthing-Principle of different
	& Plate earthing.		different methods of	methods of earthing. i.e.
	Measure earth		earthing.(13 hrs.)	Pipe, Plate, etc Importance of
	resistance by earth	56.	Measurement of Earth	Earthing. Improving of earth
	tester.	_ 1	resistance by earth tester.(6	resistance
			hrs.)	Earth Leakage circuit breaker
		57.	Testing of Earth Leakage by	(ELCB).
			ELCB and relay. (6 hrs.)	In absence of latest revision in
				respective BIS provision for
			세탁리 - 여원(연	Earthing it is recommended to
			-3	follow IEC guidelines.
21	Select and perform	58.	Determine the resistance by	Basic electronics- Semiconductor
	electrical/ electronic		Colour coding. (4 hrs.)	energy level, atomic structure 'P'
	measurements with	59.	Identification of active/passive	type and 'N' type.
	appropriate		components. (5 hrs.)	Type of materials –P-N-junction.
	instrument.	60.	Diodes -symbol - Tests -	Classification of Diodes – Reverse
			Construct & Test Half wave	and Forward Bias,
			rectifier ckt. (8 hrs.)	Heat sink. Specification of Diode
		61.	Full wave rectifier ckt. Bridge	PIV rating.
			rectifier ckt. (8 hrs.)	Explanation and importance of
				D.C. rectifier circuit. Half wave, Full
				wave and Bridge circuit.



			Filter circuits-passive filter.				
22-23		sit					
24-26		Revision					
27-28	-do-	ELECTRICAL MEASURING	Type of measuring instruments –				
		INSTRUMENTS-	MC & MI, Construction & working				
		62. Measurement of voltage,	principles of Ammeter, Voltmeter,				
		current & resistance in	Ohm-meter ,Wattmeter, Energy				
		different circuits. (5 hrs.)	meter,				
		63. Direct & indirect measurement	P.F. meter, frequency meter, multi				
		of electrical power & energy.	meter, clamp meter, Megger &				
		(6 hrs.)	earth tester. Introduction of Digital				
		64. Calibration of energy meters.	meters. CT & PT. Tong tester / Clip				
		(6 hrs.)	on Meter.				
		65. Measurement of current and					
		voltage using CT & PT, Measurement of 3 Phase					
		energy using CT & PT. Phase sequence meter, measure					
		current and voltage using Tong					
		tester. (12 hrs.)					
		66. Power measurement by Two &	H 0				
		Three watt meter method					
		Insulation resistance test by	JICI				
		Megger. (7 hrs.)					
		67. Measurement of earth					
		resistance by earth tester. (4	भारत				
		hrs.)					
		68. Calibration of indicating type					
		analogue instruments:					
		voltmeter, ammeter, and					
		wattmeter. Measurement of					
		soil conductivity. Introduction					
		of Digital meters. (10 hrs.)					
29-30	Plan, draw,	DOMESTIC WIRING - METHODS,	Introduction and explanation of				
	estimate material,	INSTALLATION & TESTING-	electrical wiring systems, cleat				
	wire up and test	69. Demonstration & Practice on	wiring, casing & Capping, CTS,				
	different type of domestic wiring	connecting common electrical accessories in circuits and					
	domestic wiring	accessories in circuits and	i. c. Kules. Related to Wiring ,				



	circuits as per		testing them in series board. (8	National Building codes for house
	Indian Electricity		hrs.)	wiring, specification and types,
	rules and taking	70.	Demonstration on Testing &	rating & material.
	care of quality.		replacement of different types	
	Construction and		of fuses. (6 hrs.)	
	working of MCB &	71.	Identification of different	
	ELCB. Test a		wiring materials and their	
	domestic wiring		specifications. (6 hrs.)	
	installation using	72.	Removing of insulation from	
	Megger.		assorted wires and cables. (10	
			hrs.)	
		73.	Demonstration and practice	
			crimping thimbles/lugs of	
			various sizes. (8 hrs.)	
		74.	Jointing practice with single	
			and multi-stranded conductors	
			of different wires and cables.	
			(12 hrs.)	
31	-do-	75.	Layout on wiring boards. (5	Branching of circuits with respect
			hrs.)	to loads such as lighting and
		76.	Practice in P.V.C. insulated	power.
		- 1	cable wiring on wood buttons	CTS/PVC Conduit-surface and
			with distribution board and	concealed/metal conduit/PVC
		N.	number of points. (20 hrs.)	casing and capping.
				IE rules regarding clip distance.
) TITLE - 3E 0 E 3	Fixing of screws, cable bending etc
32	-do-	77.		Description of different electrical
			lamp controlled by one SP	fittings and accessories such as
			switch, (B) Two lamps	lamp holders, switches, plugs
			controlled by two independent	brackets, ceiling rose, cut out etc.
			switches, (C) One lamp	IS 732- 1863. Wiring materials used
			controlled by two 2way	for P.V.C. cables I.E. rules, Indian
			switches (Staircase wiring),	standards regarding the above
			(D)One lamp controlled by	wiring such as-clip distance fixing
			intermediate switch from	of screws, cable bending etc.
			three different locations,	
			(E)Hospital wiring, (F)Tunnel/	
			Godown wiring, (G)Hostel	
			wiring, (H)Bell Buzzer Indicator	



		wiring, (I)Domestic wiri	g
		practice. (25 hrs.)	
33	-do-	78. Demonstration and practice	of Description of Rowel tools and
		using Rowel tools. (8 hrs.)	Rowel plugs, their sizes, plugging,
		79. Demonstration and practice	
		casing and capping wiring. (2	
		hrs.)	to estimation procedure, P.V.C.
		80. Testing of wiring installation	., .
		by using Megger. (7 hrs.)	and grades etc.
34	-do-	81. Demonstration and practice	
		cutting and threading condu	
		pipes. (6 hrs.)	conduit.
		82. Cold and hot bending of pipe	5.
		(6 hrs.)	
		83. Fitting of condu	IT
25	do	accessories.(13 hrs.)	le leveut of light points for points
35	-do-	84. Preparation of conduit thread using different fittings and using the second	, , , , ,
		of running threads wiring	,
		conduit, using metal clad 3 p	
		plug, Earthing the condu	·
		using earth clips and ear	- A
		wire. (25 hrs.)	earth wire as per IS 732-1863.
36	Plan and execute	ILLUMINATION:-	Introduction of Illumination- Terms
	electrical	85. Installation of - Neon Sig	
	illumination system		& illumination factors, intensity of
	viz. FL tube, HPMV	L.P.), Sodium vapour, Haloge	n light –importance of light, colour
	lamp, HPSV lamp,	Lamps, single tube, doub	e available.
	Halogen & metal	tube, Metal halide lamp	s. Construction, working &
	halide lamp, CFL,	Emergency light. (9 hrs.)	applications of – Incandescent
	LED lamp etc.	86. Practice on decoration lighting	g. lamp, Fluorescent tube, CFL, Neon
		(7 hrs.)	sign, Halogen, Mercury vapour and
		87. Practice on using LUX Meter	r. types, sodium vapour etc.
		(4 hrs.)	Decoration lighting, Drum Switches
		88. Installation and testing of C	L etc.
		Lamps and LED Lamps (5 hrs.)	
37-39	Plan, draw,	INDUSTRIAL WIRING-	Connections of different types of
	estimate material,	89. Tests on insulating materia	-
	wire up and test	(10 hrs.)	normal methods of wiring, Control



	different type of	90.	Measurement of insulation	, starting and protection devices-
	industrial wiring		resistance, of commercial and	their connections, layouts and
	circuits as per		industrial installation	earthing Code practice for earthing
	Indian Electricity		Additional practice in conduit	of Industrial Wiring.
	rules and taking		wiring. (20 hrs.)	Wiring methods & types in
	care of quality.	91.	Industrial power wiring	workshop & factories.
			involving single phase &	
			3phase motors with switches	
			& starters. (20 hrs.)	
40	Plan, draw, estimate	COI	MMERCIAL WIRING-	Wiring in commercial building-
	material, wire up and	92.	Inverter wiring./ Control panel	their special precautions as per I.E.
	test different type of		wiring / multi-storeyed	rules.
	commercial and		building wiring. (18 hrs.)	Introduction to LAN wiring.
	computer networking	93.	Introduction to LAN wiring. (7	
	wiring circuits as per		hrs.)	
	Indian Electricity rules		- 1 5 X X Y	
	and taking care of			
	quality.			
41-42	-do-	94.	Installation of 1 ph. and 3 ph.	Power drives - Introduction, types,
			on line / off line UPS wiring.	advantages & disadvantages.
			(20 hrs.)	UPS- Introduction, types, Load
		95.	Testing of Industrial wiring and	calculation, Backup time
			UPS wiring installation. (30	calculation.
		L	hrs.)	arci -
43	-do-	96.	Straight and cross crimping of	Computer networking -
			RJ-45 cable. (10 hrs.)	Identification of network hardware
		97.	Crimping of co-axial cable,	/ component. CAT-6 cable, RJ-45.
			proper installation of co-axial	DTH- Introduction of direct to
			cable from dish antenna to	home system, Music channel
			Television set. (15 hrs.)	wiring/interconnecting couplers.
44	Plan, draw,	98.	Industrial wiring installations	General idea of fixing meter
	estimate material,		for mixed load, both light and	boards & taking service
	wire up and test		power. (9 hrs.)	connection. Sealing of I.C. cut out
	different type of	99.	Layout of L.V. AC/DC machines	& meters as per I.E. Rules, General
	industrial wiring		and their panels. (3 hrs.)	Electric Appliances using heating
	circuits as per	100	. Wiring of Low power A.C./ D.C.	effect – their capacities, voltage
	Indian Electricity		machines in metal conduit	ranges, Calculation of current
	rules and taking		system as per I.E. Rules. (10	
	care of quality.		hrs.)	



		101. Testing of wiring installation.	
		(3 hrs.)	
45	-do-	102. Wiring of different circuit using	Explanation of inter connection
		Single core cable use for 2	wiring circuits in the main building
		ways, intermediate master	and auxiliary blocks, meter boards
		switches etc. (20 hrs.)	and its locations. Study of layout
		103. Testing of wiring installation.	symbols in the preparation of
		(5 hrs.)	layout diagrams.
46-47	Plan, draw, estimate	COMPUTER AWARENESS:	Block diagram of computer, main
	material, wire up and	104. Identification of Computer	parts inside the system unit, ports
	test different type of	Parts, Switching ON/OFF of PC,	& connectors, of PC parts &
	commercial and	Safety Precautions. (5 hrs.)	peripherals associated with PC
	computer networking	105. Identifying and using	like-keyboard, Mouse, Printers,
	wiring circuits as per	Windows, like folders, files,	Scanners, Camera, Modem,
	Indian Electricity rules	Editing and saving. (12 hrs.)	External Storage Devices & UPS.
	and taking care of	106. Windows Explorer, Notepad,	Features of Operating System like
	quality.	Paint and calculator. (12 hrs.)	M.S. Windows, Components of
			Windows- Calculator, Notepad,
		OFFICE PACKAGE& INTERNET:	Paint, Windows Explorer.
		107. Using /Practicing WORD,	INTERNET: Websites, Browsing,
		EXCEL, POWER POINT for	Downloading Creating and Using E-
		communication. (16 hrs.)	mail ID's Using it for
		108. Documentation. (2 hrs.)	Communications.
		109. Internet Practicing – Browsing/	AIG .
		Creating Email, Downloading.	
		(3 hrs.)	
48-51		In plant training / Project w	ork
52		Examination	

Note: -

- 1. Instructor may design their own projects and also inputs from local industry may be taken for designing such new projects.
- 2. The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit a Project report after completion.



3. If the instructor feels that for execution of specific project more time is required then he may plan accordingly in appropriate time during the execution of normal trade practical.



SYLLABUS FOR WIREMAN TRADE				
	SECOND YEAR			
Week No.	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)	
53	Construct and test Half-wave, full-wave, and bridge rectifiers with filter & without filter. Trouble shoot and service of DC regulated power supply.	110. Identify the terminals of LED, Diode, transistor, Zener diode, UJT, SCR, regulator ICs and test it. (25 hrs.)		
54	-do-	111. Construct and test variable DC power supply and trouble shoot the defects in a simple power supply. (25 hrs.)	IC - voltage regulator pin configurations and applications.	
55-56	-do-	 112. Construction & testing of various electrical circuits with different accessories. (15 hrs.) 113. Connection of Calling Bell, Buzzer, Electric Iron, Heater, 	Common Electrical Accessories, their specifications-Explanation of switches, lamp holders, plugs and sockets etc. Development of domestic circuits using switches, fuse, MCB, sockets, lamp, fan,	



		Light & Fan etc. (15 hrs.)	calling bell/buzzer, Two way
		114. Practice in soldering and	switch, I.C.T.P, I.C.D.P, MCCB,
		brazing by following Indian	ELCB, RCCB etc.
		Electricity rules. (20 hrs.)	Importance of Neutral, effect of
			opening of neutral wire
			Soldering - Solders, flux and
			soldering techniques. Types of
			soldering irons-their proper use.
57	Understand the	D.C. GENERATORS,	Introduction to D.C Generators
	constructional	115. Identification of the parts of	and working principle, parts of
	features, working	D.C. Generators. (5 hrs.)	D.C. Generator.
	principles of DC	116. Testing and measuring the	Classification of Generators- Self
	machine. Starting with	field and Armature	excited and separately excited-
	suitable starter,	resistances. (5 hrs.)	their application in practical field.
	running, forward and	117. Dismantle the D.C. Generator	
	reverse operation and	and Reassemble and test for	
	speed control of DC	its working. (15 hrs.)	
	motors. Conduct the		
	load performance test	ARRESTER	
	of DC machine with	200	
	due care and safety.	A A =	
	Maintain and		
	troubleshoot of DC	i i i i i na	
	machines.		
58-59	-do-	118. Identification of different	, ,
		parts of generators testing	
		fields & Apparatus. (12 hrs.)	compound, their applications.
		119. Insulation Tresistance	Explanation of Armature reaction,
		measurements. (8 hrs.)	interlopes, commutation and EMF
		120. Building up of voltage and	equation of DC generators.
		loading generators. (10 Hrs.)	Parallel operation of Generators
		121. Servicing of generators	
		including replacing of carbon	
		brushes. (20 hrs.)	
60	-do-	MOTORS & STARTER:	Introduction to D.C. Motor-
		122. Practice in connecting	Working principle, types of
		generators- Generators-	motors Explanation of terms used
		Testing of D.C. Machines by	Torque, speed, Back E.M.F. etc.
		Megger. (12 hrs.)	Characteristics, Speed control of



		123.	General maintenance of D.C.	DC motors
			machines. (13 hrs.)	
61-62	-do-		Testing of D.C. Motors - connect run and change direction of rotation. (12 hrs.)	Necessity of starter- Types of starters, 2 point 3 point and 4 point starters, Protective devices
		125.	Study of DC starters- 2 point 3 point and 4 point speed control of D.C. Motors and speed measurement. (13 hrs.)	used. Methods of speed control, advantages, disadvantages & Industrial applications. Trouble shooting and fault rectification.
		126.	Use Revolution counter. (6	
		127.	hrs.) Trouble shooting and fault rectification. Identify and test different types of D.C motors. (19 hrs.)	
63-64	Understand the	128.	Tests on 3 phase circuit. (10	Introduction to A.C. Poly phase
	constructional features, working principles of single	129.	hrs.) Current and voltage measurement in star and	systems- advantages, 3 phase star delta. Terms used in 3Ø systems, connection and their relations
	phase and 3 phase AC		delta connections. (12 hrs.)	w.r.t. current and voltage.
	motors. Starting with	130.	Measurement A.C. 3 ph.	
	suitable starter, running, forward and	131.	power. (18 hrs.) Determine the V and I	3 ph. Power. Simple calculation of A.C. 3 phase circuit parameter - I,
	reverse operation and		relation in Star/Delta	V, Z & P.F. etc
	speed control of AC motors with due care and safety.	7 7	connections in a 3-Ph motor. (10 hrs.)	भारत
65-66	Understand the	A.C.	GENERATORS, MOTORS &	Parts and construction of
	constructional	STAR	TERS	Alternators, principle of working,
	features, working	132.	Identification of Alternator of	, · ·
	principles of	400	parts. (10 hrs.)	equation.
	Alternator set. Test,	133.	Running of Alternator by	' '
	Wire-up and run alternator.		prime mover and loading it to find out regulation at	
	Synchronization of		different loads. Testing of	
	Alternator with due care and safety.		alternators (IR tests). (28 hrs.)	Alternators, synchronising methods.
		134.	Connect and test Parallel	



		operation of alternators. (12 hrs.)
67	Understand the constructional features, working principles of single phase and 3 phase AC motors. Starting with suitable starter, running, forward and reverse operation and speed control of AC motors with due care and safety.	135. Demonstration and practice on A.C single phase motors starting and running for specific requirements. (25 hrs.) Introduction to A.C single phase motors and types. Capacitors start/run- start and run. FHP motors and their uses. Various application of A.C single phase motors.
68-70		136. Constructional details of three phase squirrel cage induction motor and slip ring induction motor. (12 hrs.) 137. Determination of slip and efficiency. (8 hrs.) 138. Familiarization of DOL starter, Star- delta starter, Autotransformer starter and slip ring IM starter. (15 hrs.) 139. Phase sequence test on three phase IM motors, Single phasing preventer. (14 hrs.) 140. Identification of A.C and D.C motors (identify motors from the stock/scrap). (8 hrs.) 141. Construction of simple control circuits using push button and contactors. (18 hrs.)
71	-do-	142. Connect and run the A.C Starters - DOL starter, Star – delta single phase and 3-Ph motors by using starters. (25 hrs.) starter.
72-73	-do-	143. A.C. motor panel wiring (slip Description of starter delta starter ring Induction type) (12 hrs.) (manual, semi and Auto).



		POWER WIRING FOR DC & AC	Formative arrangement of a
		MOTORS	motor resistance starter for slip
		144. Practice power and control	ring induction motor.
		circuits on boards. (10 hrs.)	Motor control circuit and starting
		145. Assembly & testing of the	devices. Power and control wiring
		frame for a panel – suitable	circuits of AC motors.
		for motor generator set. I.S.	
		3072 Part-II of 1861. (15	
		hrs.)	
		146. Erection of panel board,	
		fixing of controlling and	
		starting equipment,	
		necessary meters. (12 hrs.)	
74-75		In plant training/ Project we	ork
76-78		Revision	
79-82	Understand the types,	147. Identification of types of	TRANSFORMERS –
75 02	constructional	transformers. (18 hrs.)	Power Transformer – Its
	features, working	148. Test / check the polarity of	
	principles of	single phase transformer. (15	
	transformer (single &	hrs.)	transformer, their connections.
	three phase) Connect	149. Insulation testing of single	Cooling of transformer, S.C. & O.C.
	and test Transformer.	phase and Three Phase. (15	
		hrs.)	Specifications, problems on e.m.f.
		150. Conducting No-load/O.C. &	
		short circuit tests. (15 hrs.)	Characteristics of ideal
		151. Connection of transformers,	transformer.
		efficiencies of transformers,	Construction of core, winding
		parallel operation of	shielding, auxiliary parts breather,
		transformer. (25 hrs.)	conservator. Buchholz's relay,
		152. Ratio test and voltage	other protective devices.
		regulation. (12 hrs.)	Transformer oil testing and Tap
			changing off load and on load.
			Transformer bushings and
			termination. Auto transformer- Its
			construction, working,
			performance & uses.
83-85	Prepare single line	153. Familiarize and practice	GENERATION, TRANSMISSION
	diagram and layout	operation of OH line	AND DISTRIBUTION OF



	plan of electrical		components. (20 hrs.)	ELECTRICAL POWER
	transmission & distribution systems and power plants with knowledge of principle applied. Make and test power connection to substation equipments with care and safety.		Visit to generating station (Thermal/ Hydro/Nuclear) Visit to a sub-station to familiarize OH line components. (35 hrs.) Prepare a line diagram of the institute/ ITI supply system. (20 hrs.)	Generation of Electricity and their types. General idea about overhead transmission, distribution (LV,MV& HV) and their types of accessories used. General arrangement and maintenance of outdoor type of substation. Explanation of overhead bus bar, side by bar. Bus trunking and rising mains.
				I.E. rules regarding panel erection, bus bar, spacing bus bar chamber, danger boards. Connection of high voltage metering equipment used with bus bar.
86	-do-		Demonstration, testing and use of line protecting devices as per I.E. Rules. (10 hrs.) Visit to Distribution - station. (15 hrs.)	Types of Distribution, Explanation of line protecting devices and their general principle. Brief description of connection of places of use.
87-88	-do-	159. 160.	Familiarization and operation of various CBs ACB, VCB, SF6, OCB etc. (12 hrs.) Visit to sub-station. (18 hrs.) Demonstration and Tests on Multi range switches, Rotary switches. (10 hrs.) Cooker control Panel, Power circuit switches Thermostats. Mercury switches, visit/in plant training in a industry. (10 hrs.)	SUBSTATION EQUIPMENTS Switchgear-CBs — ACB,VCB, SF6, OCB etc. protection schemes, CT/PT-Protective relays, lightning arrestors, Explanation of different types of switches and switches gears multi Range switches, rotary switches, cooker control panels, power circuit switches, thermostat, mercury switches etc.
89	-do-	162.	Familiarize the parts of substations low and high voltages. (25 hrs.)	TYPES OF SUBSTATIONS - INDOOR, OUTDOOR & POLE MOUNTING Substation construction: i. Outdoor and Indoor



			substation.
			ii. E.H.T. substation
			iii. H.T. substation
			iv. Medium & low voltage
			substation (Pole mounting
			type)
90-91	-do-	163. Demonstration and practice	U.G. CABLE
		in terminating an U.G. cable	Construction of cable, Types ,
		to a bus bar chamber. (25	Application & methods of jointing
		hrs.)	UG cable & testing General idea of
		164. Crimping lugs to the	laying method and jointing
		conductors of U.G. cable and	precautions to be observed and
		connection to bus bar Loop	different accessories used for
		connection for other circuit.	medium voltage termination.
		(25 hrs.)	
92	Understand the	Synchronizing	Need of Synchronizing, various
	constructional	165. Building up the alternator	methods, precautions to be
	features, working	output voltage, synchronizing	observed while Synchronizing
	principles of	of bus bar voltage with	
	Alternator set. Test,	generated voltage. (25 hrs.)	
	Wire-up and run		_
	alternator.		I .
	Synchronization of	uu inc	
	Alternator with due		
	care and safety.		
93-94	Select, assemble, test		Control Panel elements, types and
	and wire-up control	166. Preparation of control panel	specifications. Layout and
	panel.	board and its layout fixing of	installation of panel board, Panel
		indicating meters	board wiring methods, colour
		/Instruments, Control	coding of cables for its easy
		devices, Protection devices.	identification. Grouping and
		(35 hrs.)	numbering of cables by using
		167. Fixing of cable entry and exit	ferrules.
		points (15 hrs.)	
95	-do-	168. Preventive maintenance and	Importance and advantages of
		routine tests. (8 hrs.)	maintenance. Points to be
		169. Fault location and remedy	observed to maintain the
		practice both in domestic and	installation, preventive
		industrial wirings. (10 hrs.)	maintenance and routine tests.



		170. Practice in fixing conduit along	Common faults, causes and
		with the girder, steel	remedies in domestic and
		structures station etc. (7 hrs.)	industrial wiring installation,
			Methods of Locating faults.
96-98	Plan, estimate and	Planning, Estimation and Costing	Concept and Principle of plan,
	costing of different	of Wiring-	estimation and cost. Preparation
	types of wiring system	171. Planning and Preparation of	of complete house wiring layout,
	as per Indian	layout for domestic,	industrial wiring, commercial
	Electricity rule.	commercial, Multi storied	wiring for office Lodge, Hospital,
		building wiring and workshop	Bank, Hotels etc.
		electrical wiring. (50 hrs.)	I.E. rules for Multi-storied
		172. Estimation and costing of	buildings.
		Labour, materials and	
		accessories as per layout. (25	
	hrs.)		
99-100	Project Work (work in a team)		
	(i) Over hauling and Testing of 3 phase Induction motor		
	(ii) Over haul	ing and testing of Ceiling / Table Fan.	
	(iii) Preparati	on of series test board with indicating	digital metres.
	(iv) Construction and test regulated power supply of 6-12 Volt DC.		
	(v) Construct and Test Decorative running LED lamp assembly.		
	(vi) Installation of Pump set.		
101-102	Project work/ Industrial visit		
103-104	Examination		

Note: -

- 1. Some of the sample project works (indicative only) are given at the mid and end of each year.
- 2. Instructor may design their own projects and also inputs from local industry may be taken for designing such new projects.
- 3. The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned in a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit a Project report after completion.
- 4. If the instructor feels that for execution of specific project more time is required then he may plan accordingly in appropriate time during the execution of normal trade practical.





Skill India

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

S No.	Workshop Calculation and Science	Engineering Drawing
	FIRST	YEAR
1.	<u>Unit</u> : Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Engineering Drawing: Introduction and its importance Relationship to other technical drawing types
		Conventions Viewing of engineering drawing sheets. Method of Folding of printed Drawing Sheet as



		per BIS SP:46-2003
2.	Fractions: Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.	Drawing Instruments: their Standard and uses Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.
3.	Square Root: Square and Square Root, method of finding out square roots, Simple problem using calculator.	Lines: Definition, types and applications in Drawing as per BIS SP:46-2003 Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) Drawing lines of given length (Straight, curved) Drawing of parallel lines, perpendicular line Methods of Division of line segment
4.	Ratio & Proportion: Simple calculation on related problems.	Drawing of Geometrical Figures: Definition, nomenclature and practice of Angle: Measurement and its types, method of bisecting. Triangle -different types Rectangle, Square, Rhombus, Parallelogram. Circle and its elements.
5.	<u>Percentage</u> : Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	Lettering and Numbering as per BIS SP46-2003: Single Stroke, Double Stroke, inclined, Upper case and Lower case.
6.	Material Science: properties - Physical & Mechanical, Types - Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.	Dimensioning: Definition, types and methods of dimensioning (functional, non-functional and auxiliary) Types of arrowhead Leader Line with text
7.	Mass, Weight and Density: Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	Free hand drawing of Lines, polygons, ellipse, etc. geometrical figures and blocks with dimension Transferring measurement from the given object to the free hand sketches.
8.	Speed and Velocity: Rest and motion, speed, velocity, difference between speed and velocity, acceleration,	Sizes and Layout of Drawing Sheets Basic principle of Sheet Size Designation of sizes Selection of sizes



	retardation, equations of motions, simple related problems.	Title Block, its position and content Borders and Frames (Orientation marks and graduations) Grid Reference Item Reference on Drawing Sheet (Item List)
9.	Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.	Method of presentation of Engineering Drawing Pictorial View Orthogonal View Isometric view
10.		Symbolic Representation (as per BIS SP:46-2003) of: Fastener (Rivets, Bolts and Nuts) Bars and profile sections Weld, brazed and soldered joints. Electrical and electronics element Piping joints and fittings
11.	Algebra: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	Construction of Scales and diagonal scale
12.	Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.	Practice of Lettering and Title Block
13.	Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables	Dimensioning practice: - Position of dimensioning (unidirectional, aligned, oblique as per BIS SP:46-2003) - Symbols preceding the value of dimension and dimensional tolerance Text of dimension of repeated features, equidistance elements, circumferential objects.
14.	Heat & Temperature: Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, scale of temperature, relation between different scale of temperature, Thermometer, pyrometer, transmission of heat,	1 ,9



	conduction, convection, radiation.	
15.	Basic Electricity: Introduction, use of electricity, how electricity is produced, Types of current_ AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections — series, parallel, electric power, Horse power, energy, unit of electrical energy	Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.
16.	Levers and Simple Machines: levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.	Free Hand sketch of hand tools and measuring tools used in respective trades.
17.		Projections: - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1st angle and 3rd angle projection as per IS specification
18.	OKIII	Drawing of Orthographic projection from isometric/3D view of blocks
19.		Orthographic Drawing of simple fastener (Rivet, Bolts, Nuts & Screw)
20.	काशल मारत	Drawing details of two simple mating blocks and assembled view.
	SECOND	YEAR
1.	Elasticity: Stress, strain, Modulus of elasticity, elastic limit, Hooks law, young's modulus.	Sign & Symbol Trade related Alternating Current Drawing of simple electrical circuit using electrical symbols. Drawing of sine square & triangular waves. Diagram of battery charging circuit. Practice in reading typical example of circuit containing R, L & C. Reading of electrical drawing.



2.	Material: Introduction, types and	Electronic components
	properties. Uses of Conducting, Semi-	Symbols for electronic components. Diode,
	conducting and insulating materials.	Transistor, Zener diode, S.C.R., UJT, FET, I.C.
		Diac, Triac, Mosfet I.G.B.T etc.
		Drawing of half wave, Full wave and Bridge
		rectifier circuit.
		Drawing circuit for a single stage Amplifiers and
		Multi stage Amplifies and types of signals.
		Drawing of circuit containing UJT, FET & Simple
		power control circuits.
		Free hand drawing of Logic gates and circuits.
3.	Magnetism: Magnetic material,	Electric wirings & Earthing
	magnetic field, flux density, magnetic	Detailed diagram of calling bell, & Buzzers etc
	moment, m.m.f. Reluctance,	Free hand sketching of Staircase wiring.
	permeability, susceptibility,	Drawing the schematic diagram of plate and
	electromagnet, solenoid and its practical	pipe earthing.
	applications.	Diagram for electroplating from A.C and D.C
1	Procesures Droumatic procesure DCI have	source. DC machines
4.	Pressure: Pneumatic pressure, PSI, bar,	Graphic symbols for Rotating machines.
	atmospheric pressure, pressure gauge	Sketching of brush and brush gear of D.C.
	and absolute pressure, Heat treatment process.	machines.
	process.	Sketching of D.C. 3-point and 4-point starter.
		Layout arrangement of D.C. Generators &
		motors, control panel.
	(C' 71	Exercises on connection to motors through
		Ammeter, voltmeter & K.W. meters of electrical
		wiring diagram.
		Drawing the schematic diagram of D.C. motor
	- 1	speed control by Thyristor / DC Drive.
5.	Indices: Laws of indices related	Transformer
	problems.	Graphic symbols for Transformers.
		Free hand sketching of transformer and
	Quadratic Equation: Introduction,	auxiliary parts and sectional views.
	solution of simple Quadratic equation	Sketching a breather.
	and related problems.	Drawing the diagram of typical marking plate of
6	Solution of simple A.C. sirewith	a distribution transformer. Illumination
6.	Solution of simple A.C. circuit with R.L.C. Calculation of power factor etc.	Free hand sketching of Mercury vapour lamp,
	n.L.c. calculation of power factor etc.	sodium vapour lamp, Fluorescent tube (Single &
		Twine), MHL lamp and their connection.
7.	A.C Waveform Calculation: Calculation	Twine, with lamp and their connection.
7.	of r.m.s, average, instantaneous value,	
	peak value. Peak to peak value,	
	Frequency and	
	i requericy and	



	wavelength calculation and their relationship	
8.	Series And Parallel Connection of Electrical and Electronic components: 1. Calculation Series and parallel connection of Resistors. 2. Calculation Series and parallel connection of Capacitors. 3. Calculation Series and parallel connection of Inductors. 4. Calculation Series and parallel connection of Batteries. Conversion of power flow to H.P. 5. Calculation of KVA.	
9.	Friction: - Laws of friction, co- efficient of friction, angle of friction, simple problems related to friction. Lubrication Concept on terms like pressure, atomspheric pressure, gauge pressure. Heat treatment necessity difference methods.	Three phase Induction motor Free hand sketching of Slip-ring and Squirrel cage Induction motor. Typical wiring diagram for drum controller operation of A.C. wound rotor motor. Drawing the schematic diagram of Autotransformer starter, DOL starter and Star Delta Starter. Drawing the schematic diagram of A.C. motor speed control by SCR /AC Drive.
10.	Forces: - Resolution and composition of forces. Representation of force by vectors, simple problems on lifting tackles like jib wall, crane-Solution of problems with the aid of vectors. General condition of equilibriums for series of forces on a body. Law of parallelogram, Triangle Law, Lami's theorem.	Alternator Tracing of panel wiring diagram of an alternator. Drawing the schematic diagram of automatic voltage regulators of A.C. generators.
11.	Centre of gravity:- Centre of gravity concept and C.G. of different lamina. Equilibrium different kinds stable, unstable and neutral. Law of parallelogram force. Triangle law, Lami's theorem stable, unstable and neutral equilibrium.	Winding Drawing the development diagram for D.C. Simplex Lap & Wave winding with brush position. Drawing the development diagram of A.C 3 – Phase, 4 Pole 24 slots single layer winding.
12.	Number system:- decimal and binary, Octal Hexa decimal. BCD code, conversion from decimal to binary and vice-versa, all other conversions.	Control Panel Practice in reading panel diagram. Local & Remote control of Induction motor with inching.



	T	
	Practice on conversions.	Forward & Reverse operation of Induction
		motor Automatic Star Delta Starter
		Automatic star delta starter with change of
		direction of rotation
		Sequential control of three motors.
13.	Estimation & costing: -Simple estimation	Distribution of Power
	of the requirement of materials etc. as	Types of insulator used in over head line. (Half
	applicable to the trade. Problems on	sectional views)
	estimation and costing.	Different type of distribution systems and
	_	methods of connections.
	Further Mensuration:-	Layout diagram of a substation.
	Values as of forestrones including conical	Single line diagram of substation feeders.
	Volumes of frustums including conical	
	frustums.	
		0
	Graph- Basics, abscissa, co-ordinate etc.	MEZ I
	V = my and V= my La graph	Market
	Y = mx and Y= mx + c graph	
14.	Simple Problems on Profit & Loss.	
	7.0	/ *
	Simple and compound interest.	

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9.2 EMPLOYABILITY SKILLS

Duration: 110 Hrs.			
1. English Literacy Duration: 20 hrs Marks: 09			
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)		
Functional Grammar Transformation of sentences, Voice change, Change of tense, Spellings.			



Reading	Reading and understanding simple sentences about self, work and environment		
Writing	Construction of simple sentences Writing simple English		
Speaking/ Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on known people, picture reading, gain confidence through role-playing and discussions on current happening, job description, asking about someone's job, habitual actions. Cardinal (fundamental) numbers, ordinal numbers. Taking messages, passing on messages and filling in message forms, Greeting and introductions, office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.		
2. IT Literacy	Duration : 20 hrs Marks : 09		
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of the computer.		
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc. Use of Common applications.		
Word Processing and Worksheet	Basic operating of Word Processing, Creating, Opening and Closing Documents, Use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & Creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.		
Computer Networking and Internet	Basic of Computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, WebsSite, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.		



3. Communication Skills		Duration: 15 hrs Marks: 07
Introduction to Communication Skills	Communication and its importance Principles of effective communication Types of communication - verbal, non-verba on phone. Non-verbal communication -characteristics, language Body language Barriers to communication and dealing with Handling nervousness/ discomfort.	components-Para-
Listening Skills	Listening-hearing and listening, effective lister effective listening, guidelines for effective listeriple- A Listening - Attitude, Attention & Adactive listening skills.	istening.
Motivational Training	Characteristics essential to achieving success The power of positive attitude. Self awareness Importance of commitment Ethics and values Ways to motivate oneself Personal goal setting and employability plan	
Facing Interviews	Manners, etiquettes, dress code for an interdolors &don'ts for an interview	view
Behavioral Skills	Problem solving Confidence building Attitude	गरत
4. Entrepreneurship Skill	s	Duration: 15 hrs Marks: 06
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue Entrepreneurship vs. management, Entrepreneurial motivation. Performance & record, Role & function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
Project Preparation & Marketing Analysis	Qualities of a good entrepreneur, SWOT and &Application of PLC, Sales &Distribution man between small scale &large scale business, Nof marketing, Publicity and advertisement, No	nagement. Difference Narket survey, Method



Institution's Support	Preparation of project. Role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/non-financing support agencies to familiarize with the policies / programmes, procedure & the available scheme.		
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop act, Estimation &costing, Investment procedure - Loan procurement - Banking processes.		
5. Productivity		Duration: 10 hrs Marks: 05	
Benefits	Personal/ Workman - Incentive, Production Improvement in living standard.	linked Bonus,	
Affecting Factors	Skills, Working aids, Automation, Environm improves or slows down productivity.	ent, Motivation - How it	
Comparison with Developed Countries	Comparative productivity in developed cou Japan and Australia) in select industries, e.g Mining, Construction etc. Living standards of	g. Manufacturing, Steel,	
Personal Finance	Banking processes, Handling ATM, KYC regi	stration, safe cash	
Management	handling, Personal risk and insurance.	Duration : 15 hrs	
6. Occupational Safety, H	lealth and Environment Education	Marks : 06	
Safety & Health	Introduction to occupational safety and health at workpla		
Occupational Hazards	Basic hazards, chemical hazards, vibroaco hazards, electrical hazards, thermal haza occupational hygiene, occupational disprevention.	rds. occupational health,	
Accident &Safety	Basic principles for protective equipment. Accident prevention techniques - control of measures.	faccidents and safety	
First Aid	Care of injured &sick at the workplaces, First sick person.	st-aid &transportation of	
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of I	ndia.	
Ecosystem	Introduction to environment. The relations environment, ecosystem and factors causing	· '	



Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.	
Energy Conservation	Conservation of energy, re-use and re	ecycle.
Global Warming	Global warming, climate change and	ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and harvesting of water.	
Environment	Right attitude towards environment, Maintenance of in-house environment.	
7. Labour Welfare Legis	lation	Duration: 05 hrs Marks: 03
Welfare Acts	Benefits guaranteed under various ac Apprenticeship Act, Employees State Wages Act, Employees Provident Fun Compensation Act.	Insurance Act (ESI), Payment
8. Quality Tools		Duration: 10 hrs Marks: 05
Quality Consciousness	Meaning of quality, Quality characteristic.	
Quality Circles	Definition, Advantage of small group activity, objectives of quality circle, Roles and function of quality circles in organization, Operation of quality circle. Approaches to starting quality circles, Steps for continuation quality circles.	
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.	
House Keeping	Purpose of housekeeping, Practice of good housekeeping.	
Quality Tools	Basic quality tools with a few example	es.





LIST OF TOOLS & EQUIPMENT				
WIREMAN (For batch of 20 Candidates)				
S No.	Name of the Tools and Equipment	Specification	Quantity	
A. TRAINEES TOOL KIT				
1.	Steel rule	300 mm	*21 Nos.	
2.	Screw Driver	200 mm	*21 Nos.	
3.	Screw Driver	100 mm	*21 Nos.	
4.	Terminal screw Driver	75 mm (Connector)	*21 Nos.	
5.	Knife Electrician	D.B.	*21 Nos.	
6.	Hammer Ball peen.	0.25 Kg	*21 Nos.	
7.	Plumb bob	115 grams	*21 Nos.	
8.	Combination pliers insulated	200 mm	*21 Nos.	
9.	Neon tester pencil bit type	500 volt	*21 Nos.	
10.	Try square	200 mm	*21 Nos.	
11.	Small crimping tools (assorted)	10 – 100 mm (5 nos)	*21 Nos.	
12.	Spanner set DE	Set of 6 from 6x7 to 16x7	*21 Nos.	
13.	Screw driver set (set of 5)	100-300 mm	*21 Nos.	
14.	File half round 2 nd cut	250 mm	*21 Nos.	
15.	File round 2 nd cut	150 mm	*21 Nos.	
16.	Soldering iron	60 w/230 v	*21 Nos.	
17.	Neon tester	230 v	*21 Nos.	
B. EQUIP	MENT, MACHINERY & METERS			
18.	Conduit pipe cutting and threading machines adjustable	for 15mm to 30mm.	1 No.	



machine, suitable 30mm pipe 1 No. e 20. Bar magnet 1 No. e 21. Drill bit 6mm, 8mm & 10 mm 1 No. e 22. Horse shoe magnet 23. Crimping tool 25mm 1 No. e 24. Crimping tool for telephone/LAN cable 25. Rubber matting 2 meter x 1 meter x 9mm 2 not meter projection on the top 27. Fire extinguishers Dry chemical 5 Kg 2 No. 28. Set of Wall jumper octagonal 600mm 2 not good not g	each o.
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40. Firmer chisel 1" 10 N	S.
	S.
	os.
41. Firmer chisel ½ " 10 N	os.
42. Hammer Ball Peen 0.50 kg. 5 No	S.
43. Wire stripper 150 mm 5 No	S.
44. Hammer Ball Peen 1.00 kg 5 No	S.
45. Hammer cross Peen 0.50 kg. 5 No	S.
46. Rawal tool holder & Bit No.8, 10, 14, & 16 2 se	ŧt
47. Set of Wall jumper octagonal 37mm X 450mm and 37 X 4 se 600mm	ts
48. Scriber 150mm 2 No	os.
49. File flat 300mm rough 5 No	
50. File flat round 150mm smooth 5 No	
51. File round 300mm 2nd cut 5 No	13.
52. File triangular 150mm 2nd cut 5 No	



53.	Spanner set of 6 18X18, 20X22, 21X23, 24 X27, 25X27, 30X32,	Double ended	2 sets
54.	Adjustable spanner 300mm		1 No.
55.	Foot print Grip	250mm	2 Nos.
56.	Allen keys	Set 5 to 11	1 set
57.	Spirit level	300mm	1 No.
58.	Electric soldering iron	125 watts 230-250 V	2 Nos.
59.	Blow lamp	1 liter capacity	2 Nos.
60.	Forge with hand blower	,	1 No.
61.	Bench vice	150mm	5 Nos.
62.	Hand vice	50mm jaw	5 Nos.
63.	Rubber gloves	5000volts	2 pairs
64.	Safety belt with provision for		10 Nos.
	keeping tools		
65.	Tower ladder on type wheels	Min 10ft-Max 30ft	2 Nos.
66.	Portable extension ladder	Aluminum 6 to 9 meters	1 No.
67.	Trowel	150mm	2 Nos.
68.	All types C.F.L. lamp sets	5watt,15watt,2 5watt	3each
69.	Multi meter	0-5, 100, 200, 500 milli amperes 0-100- 1000, 10000	4 Nos.
		ohms. 0-150, 300, 600 V AC/DC	
70.	Hot wire Ammeter	0-15 Amps.	1 No.
71.	Wheatstone Bridge	,	1 No.
72.	Electrical power drilling machine	12mm, capacity 250 volts	1 No.
, = .		universal type	
73.	Megger (Insulation tester)	500 volts	2 Nos.
74.	Voltmeter M.C.	O300 volts	1 No.
75.	Voltmeter M.C/ Multi range	0.70, 150,300 & 600 V	1 No.
76.	Voltmeter M.C. Multi range	0-15,30,50 & 75 V	1 No.
77.	Voltmeter centre zero	15-0-15 volts	1 No.
78.	Voltmeter M.I. multi- range	0-150, 300, 600 V	2 Nos.
79.	Voltmeter M.I. multi- range	0-50, 75, 150 V	1 No.
80.	Ammeter M.I.	0-30 Amp, panel board type	2 Nos.
81.	Ammeter M.I.	0-5Amp. Panel board type	2 Nos.
82.	Ammeter M.I	0 - 10 Amp. panel board	1 No.
		mounting type	
83.	Ammeter M.C. Centre zero	5-0-5Amp	1 No.
84.	Ammeter MC	0 – 1 Amp	1 No.
85.	Field regulator	0 – 1000 ohmic, 2 Amps	1 No.
86.	Single phase K.W.H meter digital	5A, 250 V A. C	4 Nos.
87.	Single phase K.W.H meter analog	5A, 250 V A. C	4 Nos.
88.	3 Phase KW meter	15A 440 v	1 No.
89.	Watt meter Dynamo meter type	5 Amps. And 250 v, 1.25 kw	1 No.



90.	Personal computer system with printer		1 No.							
91.	LCD projector		1 No.							
92.	Clamp on ammeter	0-25A,0-200A	2 Nos.							
93.	Three phase K.W.H meter analog	25A,415 V A. C	4 Nos.							
94.	Three phase K.W.H meter digital	25A,415 V A. C	4 Nos.							
95.	UPS 500VA with battery	230V	1 No.							
96.	D.C. compound motor	3 H.P 250 V with 4 point	1 No.							
	'	starter and field regulator								
		(Laboratory type)								
97.	D.C. shunt motor	3 H.P 250 v with 3 point	1 No.							
		starter and speed regulator								
		(Laboratory type)								
98.	D. C. series motor with 2 point	3 H.P 250 v with 3 point	1 No.							
	starter	starter and speed regulator								
		(Laboratory type)								
99.	DC Power supply	250v DC , 25 Amp	1 No.							
100.	Capacitor motor	1/2 H.P. single phase 250 V	1 No.							
101.	Split phase motor	1/2 H.P. single phase 250 V	1 No.							
102.	Universal motor	1/2 H.P.AC/DC 250 V	1 No.							
103.	M.G. Set consisting of squirrel	3 phase air circuit breakers	1set							
	cage induction motor 5 H.P. 400 V	Star Delta starter (contact	1 No.							
	cycle with directly coupled	type 8 point) & Automatic								
	compound generator 3K.W. 250 V	type								
	with built in panel board	D.C circuit breaker	1 No.							
	consisting of :	Suitable voltmeter on A.C. &	1 No.							
		D.C. side								
		Sunk field regulators	1 No.							
	4.3	Suitable line ammeters on A.C.	1 No.							
	क्रीशक भागव	and D.C. side								
	काराल नारत	Field circuit ammeter	1 No.							
		Indicating lamps on both the	1 No.							
		sides (AC &DC)								
104.	Squirrel cage induction motor 3		1 No.							
105	H.P. 400 V with D.O.L. starter Squirrel cage induction motor 5		1 No.							
105.	H.P. 400 V with star delta starter		T IAO.							
106.	Manual star Delta starter		1 No.							
107.	Semi-automatic star Delta starter		1 No.							
108.	Automatic star Delta starter		1 No.							
109.	Automatic Reverse Forward		1 No.							
100.	starter									
110.	Single phasing preventer	415V	3 Nos.							
111.	D.O.L starter		1 No.							
112.	Two point starter for DC series		1 No.							



	motor				
113.	Soft starter 1ph		1 No.		
114.	Tachometer digital type	Non contact type 0-6000 RPM	1 No.		
115.	Flux meter		1 No.		
116.	2KVA Alternator with 3 ph induction motor		1 No.		
117.	5 HP Slip ring induction motor with rotor resistance starter		1 No.		
118.	Lux meter		1 No.		
119.	Lead Acid battery 75Ah	12V	1 No.		
120.	Battery Charger	15V,Current controlled	1 No.		
121.	Solar street light lamp set	12v , 18 / 24 watts	4 no		
122.	Hydraulic crimping tool for UG cable crimping with bits	20 sq mm to 250sq mm	1 No.		
123.	Transformer single phase	1 K.V.A. 250/100v	2 Nos.		
124.	Transformer Three phase (oil cooled)	5 K.V.A. 440/220 v	2 Nos.		
125.	Transformer oil testing kit	Automatic 60kv	1 No.		
126.	Autotransformer	Single phase 0- 300V 1kVA	2 Nos.		
127.	Autotransformer	Three phase 0- 500V 1kVA	2 Nos.		
128.	Current transformer	10/1, 20/1,30/1,50/5, 100/5 and 300/5A	1 each		
129.	Potential transformer	220/110, 300/110, 440/110, 600/110	1 each		
130.	Miniature circuit breaker(MCB)	220V/ 6 Amps	2 Nos.		
131.	Earth leakage circuit breaker (ELCB)	220V/25mA	2 Nos.		
132.	Metal clad circuit breaker (MCCB)	220V/1A	2 Nos.		
C. WORK	SHOP FURNITURE'S				
133.	Instructors table (Junior Executive)	ن	1 No.		
134.	Instructors chair – Full Arm, Caned Back & Seat		2 Nos.		
135.	Metal rack	100x150x45 cm	4 Nos.		
136.	Lockers with 16 drawers standard size with key		1 No.		
137.	Steel almirah	2.5x1.20x0.50 m	2 Nos.		
138.	White board		1 No.		
139.	Computer table		1 No.		
140.	Computer chair - Revolving		2 Nos.		
141.	Printer and computer table		1 No.		
142.	Work bench	2.5x1.20x0.75meters	2 Nos.		
143.	Steel locket standard size with 8 Drawers in each		2 Nos.		



144.	Almirah	1.8 x 1.2 x 0.45meters	2 Nos.		
145.	Demonstration table	2.5 x 1.25 x 0.75 meter	2 Nos.		
146.	Blackboard with easel	3' x 6'	1 No.		
147.	Stools	1' x 1'x 1.5'	*20 Nos.		
148.	Metal rack	180 x 150 x 45cm	1 No.		

Note: -

- 1. All the tools and equipment are to be procured as per BIS specification.
- 2. Quantity marked with * has been increased as per the batch size.
- 3. Internet facility is desired to be provided in the class room.



Skill India कौशल भारत-कुशल भारत

Tools & Equipment for Employability Skills								
S No.	S No. Name of the Equipment							
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.						



2.	UPS – 500 VA	10 Nos.					
3.	Scanner cum Printer	1 No.					
4.	Computer Tables	10 Nos.					
5.	5. Computer Chairs						
6.	1 No.						
7. White Board 1200 mm x 900 mm 1 No.							
Note: Above Tools & Equipment not required, if Computer LAB is available in the institute.							







FORMAT FOR FORMATIVE ASSESSMENT

Name & Address of the Assessor:					Year of Enrollment:										
Name & Address of ITI (Govt./Pvt.):					18			Date of Assessment:							
Name & Address of the Industry:				-	Ž,	7		Assessment location: Industry / ITI							
Trade Name: Examination			ation:				Duration of the Trade/course:								
Learning Outcome:															
	Maximum Marks (Total 100 Marks)		15	5	10	5	10)	10	5	10	15	15		
S No.	Candidate Name	Father's/Moth er's Name	Safety Consciousness	Workplace Hygiene & Economical use of materials	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of	Knowledge	Skills to Handle Tools/ Equipment/ Instruments/ Devices	Economical use of Materials	Working Strategy	Quality in Workmanship/ Performance	VIVA	Total Internal Assessment Marks	Result (Y/N)
1						Ġ									
2															