CURRICULUM

Telecommunication Technician

06 Month Program

NATIONAL TRAINING BUREAU
H-9, ISLAMABAD

1. Introduction

This course aims at imparting theoretical as well as practical knowledge of PCs based PABXs with a view to enable them to install, operate and maintain shall PABXs (including cabling) being extensively used in small & medium business, offices, multistory buildings, etc.

2. Training Objective:

On successful completion of the course the trainee would acquire the following skills: -

- Use of hand tools, electrical / Electronic measuring tools etc.
- Handling of Power Supply, UPS system, stabilizer etc.
- Surveying of building for cable installation.
- Laying, testing, jointing of cable system and its maintenance.
- Installation / repair of telephone sets.
- Identification of different parts of a PC and peripherals.
- PABX system installation, routine maintenance preventive maintenance.
- Use of relevant test equipments.

3. Key Benefits:

At the end of this course the student will understand the mini exchange network specifically PABX technology and practical skills required to install, troubleshoot and restore the network. Extensive hands-on labs provide the exposure of actual field environment and confidence to work freely.

4. CURRICULUM SALIENT:-

Entry-Level	Matric/F.Sc/DAE
Duration of course	6 Months
Training Hours	720 Hours 30Hours a week
Training Methodology	80% Practical 20% Theory
Medium of Instructions	Urdu / English

Scheme of Studies

(6 Months Telecommunication Technician Course)

Sr. No	Topic	Theory (Hours)	Practical (Hours)	Total (Hours)
1.	Fundamentals of Electrical and Electronics	25	60	85
2.	Telecom Power System	15	30	45
3.	Computer Application	12	100	112
4.	Telecommunication Fundamentals	8	18	26
5.	Computer Networks	18	60	78
6.	Basic Telephony	7	20	27
7.	Cables	18	108	126
8.	PABX	24	110	134
9.	Test Equipments	15	60	75
10.	Revision	2	10	12
	Total	**144**	**576**	**720**

Sr. No	Detail of Contents	Theory Hours
1	**Fundamentals of Electrical and Electronics**	
	1.1. Basic Electricity	**3**
	1.1.1. Atom	
	1.1.2. K, L and M shell	
	1.1.3. Valence electrons	
	1.1.4. Conductors, insulators and semiconductors	
	1.1.5. Electrical Quantities	
	1.1.5.1. Charge	
	1.1.5.2. Potential difference	
	1.1.5.3. Current	
	1.1.5.4. Resistance	
	1.1.5.5. Unit of each quantity	
	1.2. DC & AC Fundamentals	**5**
	1.2.1. Ohm's Law	
	1.2.2. Definition of Ohm's law	
	1.2.3. Mathematical formula	
	1.2.4. Calculation on ohm's law	
	1.2.5. Sine wave	
	1.2.6. Cycle	
	1.2.7. Wavelength and its unit	
	1.2.8. Frequency ant its unit	
	1.2.9. Amplitude and its unit	
	1.2.10. AC sine wave form and its characteristics.	
	1.3. Electrical Measuring Instruments	**2**
	1.3.1. Ampere Meter	
	1.3.2. Volt Meter	
	1.3.3. Digital Multimeter	
	1.3.4. Clamp-On AC Meter	
	1.3.5. Oscilloscope	
	1.4. Passive Components	**4**
	1.4.1. Construction of resistor	
	1.4.2. Types of resistors	
	1.4.3. Color coding of resistors	
	1.4.4. Series combination of resistors	
	1.4.5. Parallel combination of resistors	

	1.4.6. Series-Parallel combination of resistors 1.4.7. Capacitors 1.4.8. Types and uses of capacitors 1.4.9. Energy stored in capacitors **1.5. Batteries** 1.5.1. What is a battery? 1.5.2. Working principle of batteries 1.5.3. Type of batteries 1.5.4. Charging of a secondary battery **1.6. Transformer** 1.6.1. Definition of transformer 1.6.2. Working principle of transformer 1.6.3. Construction of transformer 1.6.4. Types of transformer 1.6.5. Use of transformer in electronics and telecommunication **1.7. Semiconductors** 1.7.1. Definition 1.7.2. Intrinsic semiconductors 1.7.3. Extrinsic semiconductors 1.7.4. Doping 1.7.5. N-type semiconductors 1.7.6. P-type semiconductors 1.7.7. Semiconductor diodes **1.8. Rectifiers** 1.8.1. Rectification 1.8.2. Types of rectifier 1.8.2.1. Half wave rectifier 1.8.2.2. Full wave centre tapped rectifier 1.8.2.3. Full wave bridge rectifier	**2** **2** **3** **4**
2	**Telecom Power System** **2.1.** What is rectifier **2.2.** Purpose of rectifier in telecommunication **2.3.** What is battery **2.4.** Purpose of batteries in telecommunication **2.5.** Series connection of batteries **2.6.** Parallel connection of batteries **2.7.** Installation of rectifiers	**15**

	2.8. Installation of battery banks **2.9.** Installation of circuit breaker panels **2.10.** Electrical wiring between rectifiers, circuit breaker panels and battery banks **2.11.** AC & DC wiring **2.12.** Grounding of telecommunication equipment **2.13.** Grounding of telecom cables	
3	**Computer Application**	
	3.1. Introduction to Computer: End-User Point of View 3.1.1. General introduction to computers 3.1.2. Input and Output Devices 3.1.3. Identification of I/O devices 3.1.4. Storage devices 3.1.5. CPU	**1**
	3.2. Word Processing 3.2.1. Opening and Closing Word Processor Application Program 3.2.2. Opening, Saving and Closing Document 3.2.3. Editing and Navigating Document 3.2.4. Document Views and Printing Documents 3.2.5. Formatting Document and Inserting Objects	**4**
	3.3. Spread Sheet 3.3.1. Opening and Closing Spread Sheet Application Program 3.3.2. Entering and Editing Data 3.3.3. Worksheets and Workbooks 3.3.4. Printing Worksheet 3.3.5. Formatting Cells 3.3.6. Calculation Using Formula	**4**
	3.4. Presentation 3.4.1. Opening and Closing Presentation Application Program 3.4.2. Presentation Views 3.4.3. Entering and Editing Presentation Objects 3.4.4. Slides and Transition 3.4.5. Animation	**2**
	3.5. Internet	**1**

	3.5.1. Opening and Closing Internet Browser 3.5.2. E-Mail 3.5.3. Search Engine 3.5.4. Surfing the WWW	
4	**Telecommunication Fundamentals** **4.1. Definition and concept** 4.1.1. Components of a communication system 4.1.1.1. Transmitter 4.1.1.2. Medium 4.1.1.3. Receiver 4.1.2. Definition of Telecom 4.1.3. Examples **4.2. Major parts of a telecommunication network** 4.2.1. Access network 4.2.1.1. Fixed line Access Network 4.2.1.2. Wireless Access Network (WLL) 4.2.2. Switching network 4.2.3. Transmission Network 4.2.3.1. Transmission by copper cables 4.2.3.2. Transmission by satellite 4.2.3.3. Transmission by microwave 4.2.3.4. Transmission by fiber optic	**2** **6**
5	**Computer Networks** **5.1.** Introduction to network **5.2.** Classification of network **5.3.** Needs and future trends **5.4.** OSI model basics **5.5.** Understanding of TCP/IP **5.6.** Major components of network **5.7.** Function of all components of network **5.8.** Building a small network	**18**
6	**Basic Telephony** **6.1.** Distribution Point (DP) **6.2.** Distribution Cabinet (DC) **6.3.** Main Distribution Frame (MDF) **6.4.** Switch Room **6.5.** Pulse Code Modulation	**7**

	6.6. Multiplex section **6.7.** Digital Distribution Frame (DDF) **6.8.** Transmission Equipment	
7	**Cables** **7.1. Cables** 7.1.1. Introduction 7.1.2. Types of cables 7.1.3. Selection of proper cable 7.1.4. Re-cognition **7.2. Surveying** 7.2.1. Survey of a building for cable installations 7.2.2. Route selection 7.2.3. Preparation of cabling diagram 7.2.4. Cable laying 7.2.5. Protection / Ducting arrangements 7.2.6. Cable termination 7.2.7. Testing 7.2.8. Jointing 7.2.9. Distribution board 7.2.10. Coupling the PABX 7.2.11. Routine maintenance of cable system and fault rectification **7.3. Telephones** 7.3.1. Introduction 7.3.2. Types 7.3.3. Pulse/Tone 7.3.4. Operation of simple telephone 7.3.5. Block diagrams 7.3.6. Identification of major parts 7.3.7. Diagnose of commonly occurring faults and rectification	**3** **11** **4**
8	**PABX** **8.1.** Introduction of exchanges (PABX) **8.2.** Difference between PBX and PABX **8.3.** Block diagram of PABX network **8.4.** Identification of various parts/ components and their interconnections	**24**

	8.5. Trunk and local lines **8.6.** Loop side **8.7.** Understanding the specification of system **8.8.** Installation techniques and requirements **8.9.** Software system configuration **8.10.** Operation of PABX **8.11.** Troubleshooting and restoration of PABX and Network	
9	**Test Equipment** **9.1.** Introduction **9.2.** Types of test equipment **9.3.** Use of test equipments **9.4.** Introduction to various tools **9.5.** Use and preventive measures	**15**
10	**Revision**	**2**
	Total	**144**

Sr. No	Detail of Contents	Practical Hours
1	**Fundamentals of Electrical and Electronics** • Use of electrical measuring instruments • Measurement of current, voltage and resistance using Ammeter, voltmeter and multimeter • Verification of ohm law • Practice of resister color coding • Verify the laws of series combination of resistors • Verify the laws of parallel combination of resistors • Series connection of batteries • Parallel connections of batteries • Charging of a secondary battery • Installation of battery banks • Assemble a half wave rectifier and verify its output wave form with the help of oscilloscope • Assemble a full wave rectifier with centre taped transformer and verify its output wave form with the help of oscilloscope • Assemble a full wave bridge rectifier and verify its output wave form with the help of oscilloscope. • Installation practice of rectifiers	60
2	**Telecom Power System** • Installation of rectifiers • Installation of battery banks • Installation of circuit breaker panels • Electrical wiring between rectifiers, circuit breaker panels and battery banks • Provision of ducts or cable racks/trays • Lying of cables and mounting of Bus bars. • Earthing arrangements • Floor requirements of battery rooms • Air-conditioning of electronic rectifiers and batteries	30

3	**Computer Application** • Input and Output Devices • Identification of I/O devices • Identification of different parts of CPU • Opening and Closing Word Processor Application Program • Opening, Saving and Closing Document • Editing and Navigating Document • Document Views and Printing Documents • Formatting Document and Inserting Objects • Opening and Closing Spread Sheet Application Program • Entering and Editing Data • Worksheets and Workbooks • Printing Worksheet • Formatting Cells • Calculation Using Formula • Opening and Closing Presentation Application Program • Presentation Views • Entering and Editing Presentation Objects • Slides and Transition • Animation • Opening and Closing Internet Browser • E-Mail • Search Engine • Surfing the WWW	**100**
4	**Telecommunication Fundamentals** • Function and applications of transmitter • Function and application of receiver • Classification and identification of different types of medium • Identification of copper and optical fiber cables • Working of transmission system	**18**

5	**Computer Networks** • OSI model • Understanding of TCP/IP • Major components of network • Configuration of network • Building a small network • Network interface and connectors	**60**
6	**Basic Telephony** • Installation and Maintenance of DP • Installation and Maintenance of DC • Installation and Maintenance of MDF • Working and function of PCM • Function of Multiplex section • Installation of DDF racks	**20**
7	**Cables** • Types of cables • Selection of proper cable • Survey of a building for cable installations • Route selection • Preparation of cabling diagram • Cable laying • Protection / Ducting arrangements • Cable termination • Testing • Jointing • Distribution board • Coupling the PABX • Routine maintenance of cable system and fault rectification • Types of telephones • Operation of simple telephone • Identification of major parts	**108**

	• Repairing of telephone	
8	**PABX** • Identification of various parts/ components and their interconnections • Trunk and local lines • Loop side • Specification of system • Installation techniques and requirements • Software system configuration • Operation of PABX • Troubleshooting and restoration of PABX and Network	**110**
9	**Test Equipments** • Types of test equipment • Use of test equipments • Introduction to various tools • Use of test equipment in preventive measurement • Use of test equipment in corrective maintenance	**60**
	Revision	**10**
	Total	**576**

Equipment List for Telecommunication Technician Course

Sr.	Description of Tools and Equipment	Quantity
1.	Telecom Rectifiers	05 Nos.
2.	Battery Banks	02 Nos.
3.	AC Panels	05 Nos.
4.	DC Panels	05 Nos.
5.	100 Pairs Indoor Cable	03 Nos.
6.	16 Pairs Indoor Cables	02 Nos.
7.	100 Pairs UG outdoor Cable	02 Nos.
8.	50 Pairs Inside Plant Cable	02 Nos.
9.	Coaxial Cables	04 Nos.
10.	Looping cards for MDF racks	03 Nos.
11.	Looping cards for RJ-45 pannels	20 Nos.
1.	Crimping tools for RJ-45 connectors	05 Nos.
1.	Crimping Tools for RJ-11 connectors	05 Nos.
2.	Digital Telephone Set	10 Nos.
3.	Telephone Cables Spools	05 Nos.
4.	Drop Wires spool	02 Nos.
5.	DDF Rack	10 Nos.
6.	KRONE Strips	10 Nos.
7.	KRONE Punchers	06 Nos.
8.	Wrapping Tools	06 Nos.
9.	d9 patch cord	04 Nos.
10.	PABX	02 Nos.
11.	Laptop	03 Nos.
12.	Desktop PC	20 Nos.

13.	E1 Patch panel	08 Nos.
14.	Ethernet Cables	10 Nos.
15.	Clamp Meter	02 Nos.
16.	Voltmeter	04 Nos.
17.	Digital Multimeter	10 Nos.
18.	Patch Panel with BNC interface	05 Nos.
19.	RJ-45 Connectors	200 Nos.
20.	RJ-11 Connectors	200 Nos.
21.	CAT-5 cable spools	02 Nos.
22.	CAT-6 cables spools	02 Nos.
23.	Network Switches	05 Nos.
24.	Routers	04 Nos.
25.	Hub	02 Nos.
26.	DSL Routers	03 Nos.
27.	Splitter	02 Nos.
28.	Fax Machine	02 Nos.

EMPLOYABILITY OF PASS-OUTS

The pass outs of this course may find job / employment opportunities in the following areas / sectors:

- In industries Can be select as a PABX technician
- Small and corporate office as telephone technician
- Telecom solution/service providers
- Mobile Network companies
- IT Solution providers
- ISPs and DSL network provider
- Assembler / technician in Telecom product companies.
- Salesman/Technician in shops dealing with telecom equipments.
- Huge market is available outside the Pakistan especially in **Gulf.**

Reference Books:

1. Manual for Telecom Technicians
2. System Manuals

Qualification Of teacher:

DAE electronics with 2 years Experience in relevant Field.