

1	Name of Course	Certificate Course in Communication Equipment Maintenance (301118)																																															
2	Max. Nos. of Student	25 Students																																															
3	Duration	6 Months																																															
4	Type	Part Time																																															
5	Nos. of Days / Week	6 Days																																															
6	Nos. of Hours /Days	4 Hrs																																															
7	Space Required	Theory Class Room – 200 sqft Practical – 200 sqft																																															
8	Entry Qualification	S.S.C. Appeared																																															
9	Objective Of Syllabus/ introduction	1. Can able to setup a intercom network with EPABX, repair Electronic Push button Telephones and FAX Machine. 2. Introduction of Telephone system 3. Introduction of EPABX system 4. Introduction of FAX system 5. Maintenance & Repairing of Different Types Telephone Instrument, EPABX & FAX System.																																															
10	Employment Opportunity	The candidate will either to be able to take up jobs with agencies which maintain and repair such equipments or with working experience will be in a position to start his own independent business.																																															
11	Teacher’s Qualification	Diploma in electronics & Telecommunication																																															
12	Training System	<table><tr><th colspan="7">Training System Per Week</th></tr><tr><td colspan="2">Theory</td><td colspan="2">Practical</td><td colspan="3">Total</td></tr><tr><td colspan="2">6 hrs</td><td colspan="2">18hrs</td><td colspan="3">24hrs</td></tr></table>						Training System Per Week							Theory		Practical		Total			6 hrs		18hrs		24hrs																							
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13	Exam. System	<table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30111811</td><td>Basic Electronics & Assembly Technique</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30111812</td><td>Basic Telephone Instrument & EPABX System</td><td>TH-II</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>3</td><td>30111821</td><td>Basic Electronics & Assembly Technique</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>4</td><td>30111822</td><td>Basic Telephone Instrument & EPABX System</td><td>PR-II</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td></td><td></td><td>TOTAL</td><td></td><td></td><td>400</td><td>170</td></tr></table>						Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	30111811	Basic Electronics & Assembly Technique	TH-I	3 hrs	100	35	2	30111812	Basic Telephone Instrument & EPABX System	TH-II	3 hrs	100	35	3	30111821	Basic Electronics & Assembly Technique	PR-I	3 hrs	100	50	4	30111822	Basic Telephone Instrument & EPABX System	PR-II	3 hrs	100	50			TOTAL			400	170
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SYLLABUS

Theory - I

Basic Electronics & Assembly Technique

1. Introduction of training & institute, Familiarization with the institute, type of work & responsibility of trainees, syllabus, safety precautions, elementary first aid, and symbols related to the theory Hand- Tools & equipments identification, uses and maintenance. Soldering.
2. Introduction to electricity, batteries, voltage, current, resistance & power, ohm's law. Alternating current A. C. induced voltage, current. Direct current simple lead cell, lead acid accumulator, battery charger, Battery is an electric.
3. RESISTORS: - Construction of carbon resistor wire wound resistors, wire wound resistors potentiometer, thermostat, series & parallel connection of resistors colour code of resistors, unit for resistance.
4. Capacitors :- what is capacity & capacitance parallel & series connection of capacitor in electric circuit unit of capacitor different, types of capacitor variable & fixed value trimmers, mica ceramic, paper polyester electrolytic etc value of capacitor
5. Inductor & transformer-coil concept, mutual induction series & parallel connection of inductors Types of coils air core, Iron core, Powdered iron core etc. unit for inductance Transformers, turns ratio types of transformer, step-up & step down transformer, power transformer etc.
6. Simple Meters: - Moving coil meter voltmeter, ammeter, ohm meter, multimeter (Moving coil and digital).
7. Semiconductor: - difference between semiconductor & conductor, Germanium & Silicon. Type semiconductor 'P' type & 'N' type semiconductor, P.N. junction diode, junction diode types of diodes, Zener diode, LED etc.
8. Transistor: - PNP and NPN transistor pin configuration, CB, CE, CC connection function of transistor Heat sink, use of heat sink. P C B (printed circuit Board).
9. Rectifiers, filters, Regulated power supply with Zener diode, transistors and regulator IC's 741, 7806, 7906, 7812, 7912, etc.
10. ACOUSTICS :- Wave, sound wave conversion of sound wave & electric wave by use of speaker & microphone, principle, construction & working of speaker & microphone, Types of speaker, headphones types of mic stereo sound Echo sound, Reverse sound P-A system, equalizer system.
11. Amplifier: - Range of audio amplifier frequency use of amplifier, types of amplifier transistor as an amplifier, coupling of amplifier pre-amplifier.
12. AF power amplifier: - Use of transformer matching, push-pull amp. Transformer less amplifier, differential amplifier, feedback circuit.
13. What is IC? Use of IC's in Home Theater, IC based AF power amplifiers with different no's IC's.
14. Digital Electronics :
Introduction symbols and truth table of Gates, Flip Flop, Registers, Counter, Encoder, Decoder, multiplexer, Demultiplexer, and memory. Introduction to Microprocessor.

Theory - II

Basic Telephone Instrument & EPABX System

1. Electrical and personal safety, dangers and preventions
2. Computer System :
Introduction to computer system, block diagram, introduction to various parts of computer system, input and output devices, Assembly of computer, introduction to operating system, Installation of application software, hardware maintenance.
3. Identify the components used in Push button telephone
4. Understand the various tones used in the phone circuits
5. Use of microphone and speaker
6. Differentiate pulse dialing and tone dialing and their applications
7. Functions of the dialer circuit and speech circuit
8. Testing methods of pushbutton telephone for proper functions
9. Use of various adaptors, connectors and sockets used in the telephone circuits
10. Methods to connect the trunk line and extension line in a EPABX
11. Call wait, call transfer, conference facility available in a EPABX
12. Read wiring circuits and understand the wiring of extension circuits.
13. Fax : Facsimile exchange, type of information sent, ITU-T recommendations for facsimile machines, scanning of documents, introduction to functional blocks. Read operation, CCD image sensor, optical system (conversion into electrical signal), grey scale mode, data compression, modulation, demodulation, line interface unit, receiving of documents, printing. Fax control units, ITU-T protocols. Times sequence, G3 protocol, transmission of binary signal, protocol signals. Simple faults introduction to E-MAIL.

List of Experiments :-

Practical-I

Basic Electronics & Assembly Technique

1. Introduction to work- shop & equipments care. Introduction to electricity supply system. Uses of Tools, measuring instruments soldering & disordering.
2. Identification of conductors, insulator voltage, current power. Test measure of A. C. Voltage current. Test of measure of D. C. Voltage and current.
3. To study differ. Types of resistors. Colour code reading value of resistors calculation of series & parallel resistance testing of resistance by multimeter.
4. Checking of capacitor, testing by multimeter. Function and uses of capacitor.
5. Checking of coil by multimeter. Checking of differ. Type of transformer hot checking & cold checking To study their uses.
6. Operation, Rules and use of multimeter, voltmeter, ammeter.
7. Testing of P N junction diode by multimeter Identify their poles (A & K.)
8. Transistor testing by multimeter Identification of lead, Build a CB, CC & CE circuits. Design the PCB.
9. Assembled various rectifier circuits with R.C. & L. C. filter CKT. Voltage doublers circuit.

10. Build Zener diode regulator circuit, Build transistor regulator circuits, Build a regulator circuit, and Build a regulator IC power supply.
11. To study the construction of mic's & speakers. Recording Repairing of microphone & speaker, headphones.
12. Build an audio pre-amplifier with transistor. Coupling two transistor amplifier stages.
13. Study of gates using IC's.
14. Study of Flip-Flop.
15. Study of counters
16. Study of Encoder/Decoder
17. Study of Multiplexer/Demultiplexer
18. To build A. F. power amplifier with different transistors. Use of heat-sink.
19. To Build a A F power amplifier with different IC's TDA
 - a. 810,
 - b. 1230, 2030, 4440 etc.

Basic Telephone Instrument & EPABX System

Practical-II

1. Practice procedures for safety and health hazards measures
2. Practice on Computer Hardware & Maintenance
3. Test the components used in the pushbutton telephone.
4. Identify the various tone signals used in the phones.
5. Testing of microphone and speaker
6. Testing & replacing components in the protection circuit and ringer circuit
7. Test the key pad for proper function and repair the key pad problems
8. Identify the faulty component and replace in the dialer circuit and speech circuit
9. Test and identify the fault in a pushbutton telephone
10. Identify and fix the various adaptors, connectors and sockets
11. Identify the terminals of trunk line and extension line and connect the extensions
12. Setting the call transfer, call wait and other facilities available on EPABX
13. Trace the wiring and locate the fault in the extension wiring circuit in EPABX.
14. Identify and fix the various adaptors, connectors and sockets in FAX.
15. Roll replacement & Cartridge replacement in FAX machine
16. Trace the wiring and locate the fault in the extension wiring circuit in FAX machine.

List of Equipments & Material

Multimeters -----	06 Nos.
DMM -----	06 Nos.
Logic probe -----	02 Nos.
Oscilloscope -----	04 Nos.
Function Generator-----	04 Nos
PC- -----	02 Nos.
FAX Machine -----	02Nos.
Power Supply -----	04 Nos.
Soldering Iron -----	06 Nos.
Tool kit -----	06 Set.
Telephone (MTNL)-----	03 Nos.
EPABEX System -----	02 Nos.
Other material as per list of experiments.	

Telecom Equipment Maintenance Course Reference Books

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| 1. Basic Radio and television | S.P. Sharma |
| 2. Radio made easy | D.C. Shahani |
| 3. Servicing Transistor Radio | R.C. Vijay |
| 4. Digital Electronics | Malvino |
| 5. Easy PC Maintenance and Repair | Philip Laplante |
| 6. PC Companion | S. Mehta |
| 7. Modern all about Mother board. | Manahar Lotial/Nair |
| 8. Understanding FAX and Electronic Maill, | Michael Banks |
| 9. Electronic Telephone project | Anthony J. Caristi |
| 10. Journals | |
