MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI - 51

<table>
<tr><td>1</td><td>Name of Course</td><td>C.C. In Communication System
(301124)</td></tr>
<tr><td>2</td><td>Max.Nos. of Student</td><td>25 Students</td></tr>
<tr><td>3</td><td>Duration</td><td>6 Months</td></tr>
<tr><td>4</td><td>Type</td><td>Full Time</td></tr>
<tr><td>5</td><td>Nos Of Days / Week</td><td>6 Days</td></tr>
<tr><td>6</td><td>Nos Of Hours /Days</td><td>7 Hrs</td></tr>
<tr><td>7</td><td>Space Required</td><td>Laboratory = 1000 Sq feet
Class Room = 200 Sq feet
TOTAL = 1200 Sq feet</td></tr>
<tr><td>8</td><td>Entry Qualification</td><td>S.S.C. + Any Course of Electronics Group of MSBVE</td></tr>
<tr><td>9</td><td>Objective Of Syllabus/ introduction</td><td>Awareness of Safety precautions.
Knowledge of soldering techniques, Testing, use of tools in assembly.
Application of Electronic / Electrical components used in Communication System. Ability to read schematic layouts wrings diagrams.
Repair & Maintenance of various Electronics Equipments used in Communication System.</td></tr>
<tr><td>10</td><td>Employment Opportunity</td><td>The trainee 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.</td></tr>
<tr><td>11</td><td>Teacher’s Qualification</td><td>Diploma in Electronics & Telecommunication Engineering.</td></tr>
<tr><td>12</td><td>Training System</td><td>Training System Per Week
<table><tr><th>Theory</th><th>Practical</th><th>Total</th></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table></td></tr>
<tr><td>13</td><td>Exam. System</td><td><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>30112411</td><td>Communication System</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30112421</td><td>Basic Electronics & Assembly Technique</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td>30112422</td><td>Communication System</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td>TOTAL</td><td></td><td></td><td>400</td><td>185</td></tr></table></td></tr>
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SYLLABUS

Communication System

Practical - II	Theory - I
Identify ingTelephone line, Rosset Box connections Demonstration of different types of Electronic Push Button Instruments(EPBT) and Identifying external Controls and their applications. Determining difference between different tones.	Interoduction- Telephone network, Duplex, Susbscriber's loop,Signaling Tones, DTMF dialing, Pulse Dialling, Dial tone, Ringing tone, Busy tone, Number Unobtainable tone Call in Progress tone
Assemble,test the PAN,PDN, PPM, PCM, Delta modulation Trace the various signal O/P using CRO	Modulation theory & circuit- Amplitude Modulation,(AM) DSB/SC, AM-SSB and their comparison Modulation-PAN,PDN, PPM, PCM, Delta modulation and Circuits. Principles of Multiplexing of DM & TDM , frequency generation and Synchronization circuits
Identify and Trace the Circuit for different Stages. Ringer, Speech, Dialar, etc. Trace Signal Path, Different tones - Dial, Ring, Busy, etc. Measure Loop Current, Measure Line DC Voltage, On Hook/ Off Hook AC Line Voltage Measurement and Trace Signal Wave Shape in Ring Mode at test Ringer IC input and output	Block Wise Description- Polarity Guard, Ringer Section, Speech , Different tones - Dial, Ring, Busy, etc. Dialer Section- Stage Wise Circuit Description for different brands & models .
Measure DC Voltages of Speech IC & Ringer IC Trace Signal Wave Shape in Speech Mode at IC, Signal Wave Shapes in Pulse Mode and Tone Mode at Test Points, Receiver and Transmitter (Mouth and Hearing Piece), Crystal Frequency Measurement with Frequency Counter/Oscilloscope	Fault Finding Methods-By Voltage measurements, by Wave Shape Tracing and by Signal Injecting Methods in different make/brand instruments
Stage Wise Simulated fault finding with the help of different fault finding methods, signal injecting, signal tracing and voltage measurement	IP Phones, Caller ID, Coin operation, Play phones, working principle
Identifying different input and output sockets, controls, Operating CLT for Different settings on base unit, Programming calling numbers, and getting familiar with other controls on base unit/hand set Dis-assembling CLTinstrument-Identifying SMD components, different stages circuit tracing	Introduction- Cordless Telephone Base Unit and Hand Set Technical Specification-Block Wise description, IC's Pin description, function, types of data cables-mobile phone circuits
Voltage measurements-Opto-cupler for ring detecting, Voltage Charger, CPU at ring or no ring, receiver & transmitter voltage controlled oscillators , Frequency measurements-receiver & transmitter sections of Base Unit & hand	Functional description of Base Unit -Opto-cuplar working Principal for detecting ring signal , Functional description of CPU for signal detection, coupling,
Set.	Signal, Battery Charge detection and other application

Tracing wave shapes with the help of Oscilloscope at different test points. Different stages in base unit and hand set Tx and Rx frequency settings ,	Base Unit, Hand Set receiver and transmitter RF signal and their frequenciesprocessing- Multiplexing, Modulation, Power amplification and transmission, Signal receiving and demodulation process
Simulated faults finding in Base unit and Hand set	Types of faults and their remedies
Identifying different stage- Speech Circuit ,DTMF & Pulse Dialing Circuit. Dule tone ring generating, Subscriber line & switching digital circuits, Ring & Tone Generator & it's interface	Introduction- Public Switching Telephone Network (PSTN),Central Office Line, DTMF, Subscriber, Signaling, Switching1 EPABX Standards- Stored Program Control(SPC), Space Switch, Time division multiplexing
Identify- Time Division Multiplexing & Demultiplexing , TDM pulse Modulation & demodulation	Types of EPABX- ANALOG & Digital Block diagram of digital exchange- MDF, SLIC, Trunk Line interface, CPU, TDM switching, Power Supply
Data Coding Techniques &Phase Encoded format, Amplitude Shift Keying &Frequency Shift Keying, Phase Shifting Keying Techniques	Configuration of an EPABX Architecture & Interface- SLIC, co LINE , TGU, CPU, Main Distribution Fram & Power supply
Delta Modulation & Demodulation, Adaptive Delta Modulation Demodulation, Compander , Expander, & Voice communication, Structure Configuration	EPABX System Features- direct outward dialing, Paging, Line Networking, Call privacy, line out of service, direct inward dialing, emergency Extention Features- Extension to CO line, Local call, STD ISD, Extension to Extension call, Extension to tie line, Automatic call back-busy, call forward & etc.
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Hardware & software setup of the ISDN	DC voltage- Source, Distribution and cabling
Different brand of cell phones-NOKIA, SAMSUNG, LG, MOTOROLLA, SONY, PANASONIC, NITSUBISHI, SIEMENS, etc. Identifying different components-Resistors, Diodes, Coils, Filters, Capacitors, Transistors, Crystals, Modules, Integrated Circuits	Mobile phone- introduction, user guide, Mobile Phone Circuits Diagrams, Mobile phone System -TDMA, GSM, CDMA
Mobile unit Power supply, Data processing, Display Section, Audio Section., dialing section	Mobile Phone Programming (Service Software Operation) Mobile phone data cable computer interface diagram
Circuit Tracing, Basic training, circuit reading, MIC, LED, Key pad, Speaker, Buzzer, On & Off switch, Display, Antenna, Charging pin, PCB circuit	Mobile Phone data cables, Assembling procedure, SMD Resistors, Diodes, Coils, Filters, Capacitors, Transistor,Crystal, Modules, Integrated circuits.
SMD technique Mobile spare parts and installation technique, Online	Mobile units- Power supply, data processing, Display
component testing, Input and output supply, checking 15 testing points	section,Audio section, dialing

Testing points of mobile circuits mobile problems and solution,	Work shop technique, Servicing technique,
Fault finding sequence , hardware problems and solution	Study of Mobile Software and its installation Software problems and solution. Fault finding with Software.
Mobile software installation, Software problems and solution flashing	Inteduction to GSM, SIM Cord Recorder, Advance Mobile Phones.
Identify and study the Transmitter, Receiver, Sinewave generator, optical fibre cable-parameters in Fibre optic Analog Transmission system , Intensity modulation and demodulation system . Identify and study the Transmitter, Receiver, TTL square wave generator,optical fibre cable-parameters in Fibre optic Digital Transmission system , Design and study the - Fibre optic digital link, Rise time & Fall time distortion, propagation delay Assemble and test the Microwave signal using Gunn diode, Klystron, Transmission and reception of signals	Understanding and designing of Fibre OPTIC Analog Transmission system : fundamental of fibre optics, properties of Transmission & Receiver, charectarization of fibre optic cable, fibre optic intensity modulation system for Analog Transmission & frequency response Understanding and designing of Fibre OPTIC Digital Transmission system : fundamental of fibre optics,properties of Transmission & Receiver, charectarization of fibre optic cable, design and study of Fibre optic Digital link,rise and fall time distortions, propagation delay and data transmission, CRT terminal interface and communication parameters. Basics of Microwave communication system - Frequency spectrum , Microwave generation- Gunn diode, Klystron Wave guides,Transmission and reception of Microwave signal, repeater stations, propagation

Basic Electronics & Assembly Technique

Practical - I
Tool Identification, safety precautions, Familiarization with Electronic Components. Different Type of Soldering Iron. Use of Soldering Iron. Color Code of Fixed Resistors.
Use of various Meters for Measuring Voltage, Current , Resistance etc. Safe Handling of Instruments . Use of Digital & Analog Multimeter. Familiarization with CRO. Measurement of L, C and R using LCR bridge.
Identification & Testing of various types of Diodes. Familiarization with CRO, Operating knobs. Construction of Half Wave & Full Wave Rectifiers. Calculation of Ripple using Filters to improve DC Output
Transistor Testing, study the transistor characteristics. Construction of single stage amplifier. Construction of a transistor- switch and to drive a relay.
Construction of RC Phase Shift Oscillator. Construction of Astable and Bistable multivibrator.
Plotting of V-I Characteristics of SCR/Triac, study of light Dimmer.
Lab Demonstration of all types of Digital Logic Gates. Verification of all truth table. Familiarization with various IC and their Packages.

Tools & Equipments :-

No	Description of Items	Qty
1	*Different type and brand telephone instruments*	4 each
2	Different type and brand cordless telephone	2 each
3	*Different type and brand cell phones*	2 each
4	*Mobile Trainers*	2
5	*EPBAX Trainer*	2
6	*EPABX exchanges*	1
7	*Telephone Analyzers*	1
8	Personal Computers P IV system	4
9	Different brand cell phone data cable	2
10	Digital Multimeters	4
11	Oscilloscope's 100 Mhz. Dual trace with LCD display	2
12	Frequency counters	1
13	UPS 500 VA	4
14	GSM SIM Cord Reader	1
15	Camera Phones	1
16	Coin Operated Phones	1
17	Cell Phone Test Jig	2
18	DC Regulated Power Supply 0-30V, 1 A	2
19	Temperature controlled soldering stations	5
20	SMD rework stations	1
21	Precision Screw driver sets	6
22	Multipurpose Screw driver sets	16
23	Magnifier Lens 10 X with lighting	2
24	Micro Soldering Irons with different tips	4
25	Tool kit suitable to syllabus equipment	16
26	Analog Fibre Optic Trainer	2
27	Digital Fibre Optic Trainer	2
28	Wave guides	2
29	Microwave generation Trainer	2

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