

**GOVERNMENT OF INDIA  
MINISTRY OF HOME AFFAIRS  
DIRECTORATE OF COORDINATION  
POLICE WIRELESS**

**SYLLABUS COMMITTEE REPORT  
2013**

**CENTRAL POLICE RADIO TRAINING INSTITUTE  
NEW DELHI**

**No. DCPW/ SYLLABUS / 2013/01**

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NEW DELHI**

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## PREFACE

In view of the rapid development in information and communication technologies, it has become essential for Police organisations to enhance the technical competence of their police wireless personnel. As such, a revision of the syllabus for the proficiency courses viz Grade I, II and III of, both the operational and technical trades, has become the need of the time.

The matter was discussed in the XXVIII Police Radio Officers Conference and a Syllabus Committee was appointed under the chairmanship of Director, DCPW, MHA to review the syllabus of the gradation courses. The Committee deliberated in details the revision of syllabus keeping in view the present requirement of Police and modern technology systems inducted in Police Communication. After examining the issue carefully, the committee recommended the new syllabus to achieve the objective to minimize the gap between training and field requirement.

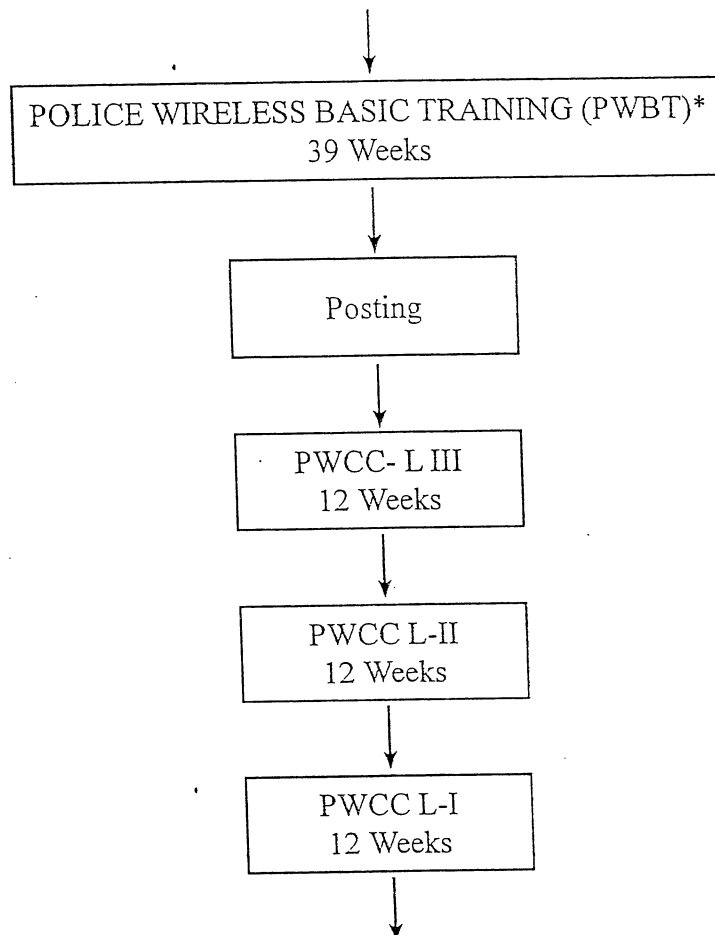
This report contains syllabus for Police Wireless Communication Courses PWCC- Level III, PWCC-Level II and PWCC- Level- I for radio operator and technician as common cadre for the direct recruited Constable. It also contains syllabus for Police Wireless Orientation Training (PWOT) course and Police wireless Communication Course-Advance Level (PWCC-AL) for the direct recruited Sub Inspector for operator and technician as common cadre. It is wished that the recommended syllabus contained in the report will enhance the competence level of the Police Communication personnel thereby augmenting the efficiency and reliability of Police Communication System.

The inception of the revised syllabus will no doubt improve the training of Police Communication Personnel in modern concepts and systems.

**Review of Proficiency Courses (Gradation Courses) of  
Syllabus Committee Report- 1995**

**FLOW CHART OF POLICE WIRELESS TRAINING PROGRAMME**

Direct Recruitment (Constable) (10 +2) with PCM  
Common Cadre (Operational & Technical)



Note: Refresher Course (2 weeks-The syllabi is same as PWCC-LIII, II & I except the topics will not be covered in detail).

1. Police Wireless Basic Training (PWBT) will be conducted by State /UT Police; \*Drill Discipline duration may be added as per requirement.
2. Police Wireless Communication Courses; PWCC-L III & PWCC-L II.

The training will be conducted by State/UT Police. PWCC-L III & PWCC-L II is promotional Courses for promotion to the post of Head Constable and ASI respectively.

The CPRTI / Regional Police Training Institute (yet to be established), DCPW, MHA to conduct these courses for those Police Organisation who do not have requisite infrastructure at their Training Institute.

### **PWCC-L III Course**

The eligibility to undergo this course for personnel's of State/UT police is completion of POLICE WIRELESS BASIC TRAINING (PWBT) of 39 Weeks duration. Is Modular in nature, consisting of 3 (three) Modules each of 4 Weeks duration. Final Exam of each Module will be conducted at the end of the Particular Module. The Candidate will be declared pass PWCC -L III only after passing all the 3 Module I, II and III of PWCC-L III. The eligibility to undergo module II is module I pass similarly for module III, module II pass. Maximum 3 (Three) supplementary attempts are permitted to pass each module I, II and III respectively to those candidates who fail in Module I, II and III. In case a candidate who does not pass a particular module within these 3 attempts, such candidate has to undergo training that particular Module afresh.

### **PWCC-L II Course**

The eligibility to undergo this course for personnel's of State/UT police is passing of PWCC-L III. Is Modular in nature, consisting of 3 (three) Modules each of 4 Weeks duration. Final Exam of each Module will be conducted at the end of the Particular Module. The Candidate will be declared pass PWCC -L II only after passing the entire 3 Module of IV, V and VI of PWCC-L II. The eligibility to undergo module V is module IV pass similarly for module VI module V pass. Maximum 3 (Three) supplementary attempts are permitted to pass each module IV, V, and VI, respectively to those candidates who failed in Module IV, V and VI. In case a candidate who do not pass a particular module within these 3 attempts, such candidate has to undergo training that particular Module afresh.

### **3 Police Wireless Communication Course; PWCC-L I**

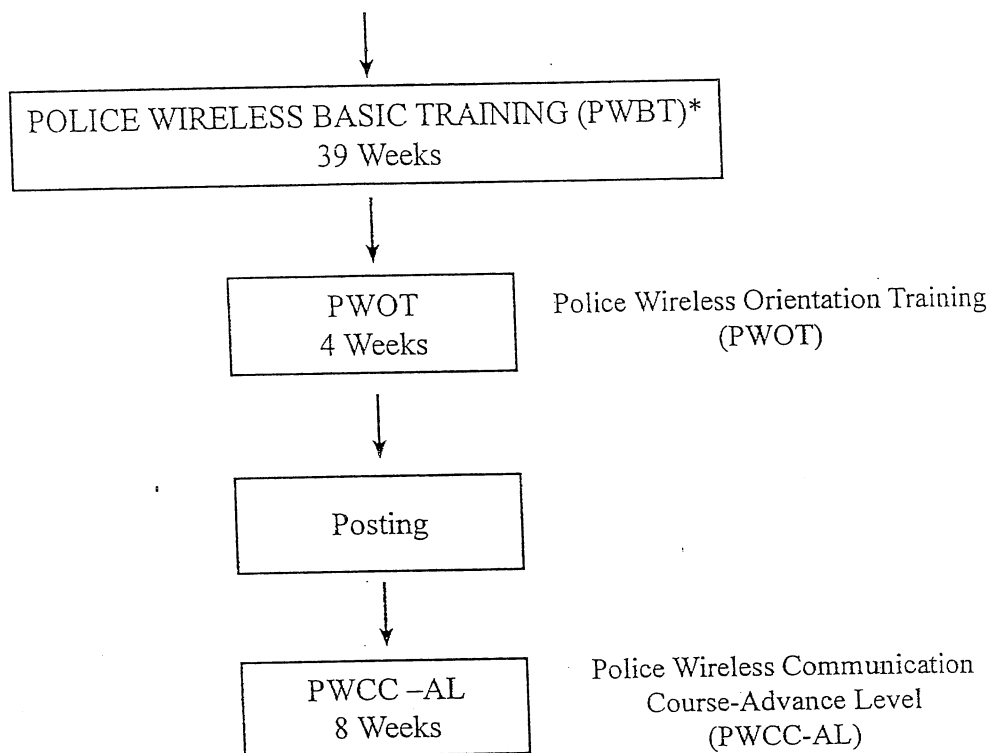
The training will be conducted by Central Police Radio Training Institute (CPRTI) / Regional Police Wireless Training Institutes (yet to be established). State / UT Police Training Institutes having requisite infrastructure for the level may also conduct PWCC-L I training.

The eligibility to undergo this course for personnel's of State/UT police is passing of PWCC-L II. PWCC-L I is Modular in nature, consisting of 3 (three) Modules each of 4 Weeks duration. Final Exam of each Module will be conducted at the end of the Particular Module. The Candidate will be declared pass PWCC -L I only after passing all the 3 Module VII, VIII and IX of PWCC-L I. The eligibility to undergo module VIII is module VII pass, similarly for module IX module VIII pass. Maximum 3 (Three) supplementary attempts are permitted to pass each module VII, VIII, and IX, respectively to those candidates who failed in Module VII, VIII and IX. In case a candidate who does not pass a particular module within these 3 attempts, such candidate has to undergo training that particular Module afresh.

**Review of Proficiency Courses (Gradation Courses) of  
Syllabus Committee Report- 1995**

**FLOW CHART OF POLICE WIRELESS TRAINING PROGRAMME**

Direct Recruitment (Sub-Inspector)      B Sc. / Diploma  
Common Cadre (Operational & Technical)



Integrated Communication Course (4 weeks)  
Refresher Course- the syllabi will be same as  
PWOT and PWCC-AL except the topics will  
not be covered in detail).

**1. Police Wireless Basic Training (PWBT)**

The training will be conducted by State /UT Police; \*Drill Discipline duration may be added as per requirement.

**2. Police Wireless Orientation Training (PWOT)**

This training may be conducted by State / UT Police / CPRTI New Delhi. The eligibility to undergo this course for personnels of State/UT police is completion of POLICE WIRELESS BASIC TRAINING (PWBT) of 39 Weeks duration. The PWOT is an orientation Technical Training of 4 Weeks duration to build up the capacity of directly recruited Sub-Inspector to work as Supervisor. PWOT is not linked with any promotion. PWOT is 4 Weeks duration course. The Final Exam of the course will be conducted in the last week

of the training. The Candidate will be declared pass PWOT only after passing the final exam. Maximum 3 (Three) supplementary attempts are permitted to pass the exam to those candidates who failed in the PWOT course. In case a candidate who do not pass the exam within these 3 attempts, such candidate has to undergo the course (training) afresh.

### 3. Police Wireless Communication Course- Advance Level (PWCC-AL)

The eligibility to undergo this course is PWOT pass. The training will be conducted by Central Police Radio Training Institute, New Delhi.

PWCC-AL is a promotional Course for promotion to the post of Inspector. The Course is a continuous Training Programme of 8 weeks duration; Final Examination will be conducted in the last week of Training Programme. The Candidate will have to pass the final examination for declaring him PWCC - AL pass. Maximum 3 (Three) supplementary attempts are permitted to pass the exam to those candidates who failed in the PWCC - AL course. In case a candidate who does not pass the exam within these 3 attempts, such candidate has to undergo the course (training) afresh.

### Evaluation of Trade Test

A Question Bank for the Theory Papers will be made upon obtaining questions from different Police Communication Training Institutes, State/UT/CPOs Police Radio Officers and from other Police Organizations, Reputed Institutes as per the Syllabi of the PWCC-LIII, PWCC-LII, PWCC-LI, PWOT and PWCC-AL. This Question Bank will be collected by CPRTI, DCPW, MHA, New Delhi. Thereafter a committee consisting of the representatives of State/UT/CPOs/other Police Organizations will prepare Question Paper from the Question Bank for the above courses. These Question Papers are sealed in an envelope and on the front superscribed as Question Paper for respective courses. The Committee shall prepare annually such quantum of Question Paper meant for different modules of PWCC-LIII, PWCC-LII, PWCC-LI, PWOT and PWCC-AL. The exam at respective places shall be conducted by the respective Police Organisations after obtaining the concerned Question Paper from CPRTI, DCPW, New Delhi. The responsibility to evaluate this theory Question Paper may be assigned to a local Police Communication Officers or to the external examiner. As regard to Practical Exams, presentation and Project Exams, the examiner may be deputed by the respective organizations. For the purpose of maintaining transparency, the State/UT may invite external examiners from DCPW as per the requirement. Based on the evaluation of theory, practical, presentation and project, the respective organization may declare the result of the course by themselves.

**POLICE WIRELESS COMMUNICATION COURSE-L III**  
**MODULE -I (4 Weeks)**

**THEORY**

- 1 RADIO PROCEDURE  
CHAPTER I TO XIII and LIST OF APPENDICES A TO O – RADIO PROCEDURE  
FOR POLICE SERVICES
- 2 INTRODUCTION TO COMPUTERS; BASIC STRUCTURE, HARDWARE &  
SOFTWARE- BRIEF, INTRODUCTION, USE OF COMPUTER AS DATA INPUT  
TERMINAL.
- 3 MESSAGE COMMUNICATION SOFTWARE FOR VSAT COMMUNICATION
- 4 COMMUNICATION SOFTWARE FOR VHF/UHF/HF DATA TRANSMISSION
- 5 BREACH OF COMMUNICATION SECURITY & PREVENTIVE MEASURES  
ETC.

**PRACTICALS:**

1. R/T RECEIVING/SENDING.....10 W.P.M.
2. MESSAGE KEYBOARD RECEIVING/SENDING.....20 W.P.M
3. MORSE RECEIVING/SENDING..... 10 W.P.M



**POLICE WIRELESS COMMUNICATION COURSE-L III**  
**MODULE -I**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERALL 50% OF THE TOTAL MARKS (200)  AND  40% IN EACH INDIVIDUAL  PAPER-I, PAPER-II(A.i), PAPER-II(A.ii), PAPER- II(A.iii)
2.	PAPER-II	(A) PRACTICAL		
		(i) R/T RECEIVING/ SENDING PRACTICAL	50	
		(ii) MESSAGE KEYBOARD RECEIVING/ SENDING PRACTICAL	25	
		(iii) MORSE RECEIVING/ SENDING PRACTICAL	25	
		TOTAL	200	

**POLICE WIRELESS COMMUNICATION COURSE-L III**  
**MODULE -II (4 Weeks)**

**THEORY**

**APPLIED MATH-I:**

LOGARITHM, COMPLEX NUMBERS, TRIGNOMETRICAL FUNCTIONS, DECIBEL

**BASIC ELECTRICITY:**

UNITS AND DIMENSIONS, BASIC COMPONENTS, DC CIRCUITS,  
ELECTRO MAGNETISM, AC THEORY, CELLS AND BATTERIES

**TRANSFORMER:**

CONSTRUCTION, TURNS RATIO, TYPES, PROPERTIES AND USES OF  
TRANSFORMERS, LOSSES AND EFFICIENCY

**NETWORK ANALYSIS:**

KIRCHOFF'S LAW, SUPERPOSITION, THEVENIN and NORTON THEOREM

**SERIES AND PARALLEL RESONANT CIRCUIT:**

THEORY, FREQUENCY RESPONSE CURVES, BANDWIDTH AND Q CHARAC-  
TERISTICS AND APPLICATION

**ELECTRONICS DEVICES & CIRCUITS -I**

INTRODUCTION TO PASSIVE & ACTIVE COMPONENTS, SEMICONDUCTOR DE-  
VICES; DIODES, TRANSISTORS- BJT, FET  
SINGLE STAGE AMPLIFIERS FEEDBACK SYSTEMS AND OSCILLATORS, RECTI-  
FIERS, LINEAR POWER SUPPLIES

**DIGITAL ELECTRONICS-I**

NUMBER SYSTEMS, LOGIC GATES, ARITHMATIC CIRCUITS, FLIP-  
FLOPS-RS, D, J K and T

**PRIMARY AND SECONDARY BATTERIES:**

TYPES OF BATTERIES, THEORY OF LEAD ACID BATTERIES, AMPERE HOUR  
CAPACITY, DRY BATTERIES

**BATTERY CHARGING**

STUDY & OPERATION OF BATTERY CHARGER & GENERATOR  
ELECTRICAL SYSTEM, CARE AND MAINTENANCE

# **POLICE WIRELESS COMMUNICATION COURSE-L III**

## **MODULE -II**

### **PRACTICALS:**

#### **ELECTRONICS DEVICES AND CIRCUIT LAB:**

1. a) IDENTIFICATION AND FAMILIARISATION OF ELECTRONICS COMPONENTS:
  - I. PASSIVE COMPONENTS  
RESISTANCE, CAPACITORS, INDUCTORS
  - II. ACTIVE COMPONENTS  
DIODES, TRANSISTORS, IC'S
- b) STUDY OF ELECTRICAL/ ELECTRONIC SYMBOLS
- c) STUDY OF MULTI- METER, CRO
2. VERIFICATION OF OHM'S LAW
3. PLOTTING OF V-I CHARACTERISTICS OF P-N JUNCTION DIODE AND ZENER DIODE
4. FABRICATION OF HALF WAVE, FULL WAVE & BRIDGE RECTIFIER AND STUDY OF INPUT , OUTPUT VOLTAGE & WAVEFORMS
5. STUDY OF ZENER DIODE AS A VOLTAGE REGULATOR
6. STUDY OF CHARACTERISTICS OF TRANSISTOR
7. TRANSISTOR BIASING CIRCUIT – OPEARTING POINT
8. SINGLE STAGE COMMON EMITTER AMPLIFIER

#### **DIGITAL ELECTRONICS LAB:**

1. LOGIC GATES & THEIR APPLICATIONS
2. ARITHMETIC CIRCUITS

#### **ELECTRICAL & MECHANICAL LAB**

STUDY & OPERATION OF BATTERY CHARGER & GENERATOR

**POLICE WIRELESS COMMUNICATION COURSE-L III**  
**MODULE -II**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I, PAPER- II(A) and PAPER- II(B)
2.	PAPER -II	(A) PRACTICALS	70	
		(B) PRESENTATION	30	
		TOTAL	200	

# **POLICE WIRELESS COMMUNICATION COURSE-L III**

## **MODULE-III (4 Weeks)**

### **THEORY**

#### **MODULATION:**

NECESSITY OF MODULATION, AMPLITUDE, FREQUENCY AND PHASE MODULATION

#### **DEMODULATION:**

BASIC CONCEPT OF DETECTION OF AM AND FM WAVES

#### **TRANSMITTERS**

BLOCK DIAGRAM OF TRANSMITTER AND FUNCTION OF EACH STAGE, OUTPUT POWER AND OTHER IMPORTANT PARAMETERS.

#### **RECEIVER:**

BLOCK DIAGRAM OF COMMUNICATION RECEIVER AND FUNCTION OF EACH STAGE, SELECTION OF I.F, IMPORTANT SPECIFICATION OF RECEIVER.

#### **WAVE PROPAGATION:**

ELECTROMAGNETIC WAVES, FREQUENCY SPECTRUM, GROUND WAVES, SPACE WAVES AND IONOSPHERE WAVES

#### **FREQUENCY MANAGEMENT**

CONCEPT, DAY AND NIGHT FREQUENCY, CRITERIA FOR SELECTION OF DAY AND NIGHT FREQUENCY

#### **TRANSMISSION LINE AND ANTENNAS:**

TRANSMISSION LINE, INTRODUCTION, TYPES, SPECIFICATION AND USES, RADIATION OF ENERGY FROM ANTENNA WIRE, VARIOUS TYPES OF HF AND VHF ANTENNAS

#### **SATELLITE COMMUNICATION:**

BRIEF INTRODUCTION, VSAT COMMUNICATION.

#### **EPABX:**

FUNCTIONAL DIAGRAM AND ITS OPERATION

#### **POWER SUPPLIES:**

DIFFERENT SOURCES OF POWER SUPPLIES, RECTIFIER; HALF WAVE RECTIFIER, FULL WAVE RECTIFIER AND BRIDGE RECTIFIER, VOLTAGE REGULATION, VOLTAGE REGULATOR USING ZENER DIODE.

**POLICE WIRELESS COMMUNICATION COURSE-L III**  
**MODULE -III**

**PRACTICALS:**

**STUDY OF FOLLOWING INSTRUMENTS**

1. AF/RF POWER METER
2. AF OSCILLATOR
3. AC MILLIVOLTMETER
4. SIGNAL GENERATOR-AM&FM,
5. FREQUENCY COUNTER

**VHF LAB**

1. STUDY OF CIRCUIT DIAGRAM OF VHF RADIO TRANSRECEIVER
2. MEASUREMENTS OF BASIC PARAMETERS OF RX/TX

**HF LAB:**

1. STUDY OF circuit diagram of HF RADIO TRANSRECEIVER
2. measurements OF BASIC PARAMETERS OF RX/TX.

**COMMUNICATION SYSTEM LAB:**

1. STUDY AND OPERATION OF VSAT COMMUNICATION SYSTEM
2. STUDY AND OPERATION OF epabx
3. STUDY OF RADIO COMMUNICATION TEST (RCT) SET.

**POLICE WIRELESS COMMUNICATION COURSE-L III**  
**MODULE -III**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I, PAPER- II(A) and PAPER- II(B).
2.	PAPER -II	(A) PRACTICALS	70	
		(B) PROJECT	30	
		TOTAL	200	

# POLICE WIRELESS COMMUNICATION COURSE-L II

## MODULE -IV (4 Weeks)

### THEORY

REVIEW OF RADIO PROCEDURE

COMPUTER SYSTEM -BLOCK DIAGRAM AND FUNCTION OF EACH BLOCK

OPERATING SYSTEM – BRIEF INTRODUCTION,

APPLICATION SOFTWARE- CREATION OF DOCUMENTS, GRAPHS AND REPORTS

VSAT COMMUNICATION SET UP - BLOCK DIAGRAM

### PRACTICALS:

#### COMPUTER LAB

1. TO CREATE A MS WORD DOCUMENT WITH PROPER FORMATTING
2. TO CREATE A TABLE IN MS WORD
3. CREATION OF GRAPH IN MS EXCEL
4. TO USE MAIL-MERGING OPTION TO CREATE MULTIPLE APPLICATIONS AND DOCUMENT.

#### MESSAGE RECEIVING

1. **R/T RECEIVING**  
RECEIVING PLAIN AND CODED MESSAGES AT 15 WORDS PER MINUTE  
SIMILAR TO THAT IN MORSE RECEIVING
2. **MORSE RECEIVING**  
PRACTICE OF MORSE RECEIVING AT 15 WORDS PER MINUTE.  
12 MESSAGES IN 15 MINUTES OF 1275 CHARACTERS WITH GRAD OF  
INTERFERENCE QRM 2.  
ONE MISTAKE = 2 MARKS AND  
ONE DEFFICENCY = 1 MARKS, ACCURACY 98.4%

#### MESSAGE SENDING

1. **R/T SENDING**  
SENDING OF PLAIN AND CODED MESSAGES AT 15 WORDS PER MINUTE  
SIMILAR TO THAT IN MORSE SENDING
2. **MORSE SENDING**  
PRACTICE OF MORSE SENDING AT 15 WORDS PER MINUTES. 12 MESSAGES  
OF 1275 CHARACTERS IN 15 MINUTES. MAX. CORRECTED ERROR  
ALLOWED = 10
3. **KEY BOARD TYPING**  
KEY BOARD TYPING AT 30 WORDS PER MINUTE OR 1275 CHARACTER IN  
15 MINUTES



**POLICE WIRELESS COMMUNICATION COURSE-L II**  
**MODULE –IV**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERALL 50% OF THE TOTAL MARKS (200)  AND  40% IN EACH INDIVIDUAL  PAPER-I, PAPER-II(A.i), PAPER-II(A.ii), PAPER- II(A.iii)
2.	PAPER-II	(A) PRACTICAL		
		(i) COMPUTER PRACTICAL	50	
		(ii) MESSAGE KEYBOARD RECEIVING/SENDING PRACTICAL	25	
		(iii) MORSE RECEIVING/ SENDING PRACTICAL	25	
		TOTAL	200	

**POLICE WIRELESS COMMUNICATION COURSE-L II**  
**MODULE -V (4 Weeks)**

**THEORY**

**APPLIED MATH-II:**

VECTOR ALGEBRA, MATRIX ALGEBRA, DIFFERENTIAL CALCULUS

**NETWORK ANALYSIS AND FILTERS:**

NETWORKS-FUNCTIONAL CLASSIFICATION & CHARACTERISTICS, NETWORK PARAMETERS- Z, Y, H AND ABCD, PASSIVE FILTERS-FUNDAMENTALS

**ELECTRONICS DEVICES & CIRCUITS -II**

MULTISTAGE TRANSISTOR AMPLIFIER, AUDIO POWER AMPLIFIER, OPERATIONAL AMPLIFIER, SWITCHED MODE POWER SUPPLY, MULTIVIBRATORS-TRANSISTOR BASED, OPTO ELECTRONICS DEVICES

**DIGITAL ELECTRONICS-II**

CODES AND PARITY, MULTIPLEXER AND DEMULTIPLEXER, DECODERS, DISPLAY DEVICES AND ASSOCIATED CIRCUITS COUNTERS AND SHIFT REGISTERS-BASIC CONCEPT, INTRODUCTION TO LOGIC FAMILIES, DTL, TTL LOGIC FAMILIES, MOS LOGIC FAMILIES, CMOS INVERTER

**OPERATIONAL AMPLIFIER AND CIRCUITS**

OP AMP BLOCK DIAGRAM AND EQUIVALENT CIRCUIT, APPLICATIONS OF OPAMP AS SUMMER, DIFFERENTIATOR, INTEGRATOR, COMPARATOR, SAMPLE AND HOLD CIRCUIT

**POLICE WIRELESS COMMUNICATION COURSE-L II**  
**MODULE -V**

**PRACTICALS:**

**ELECTRONICS DEVICES AND CIRCUIT LAB:**

1. TO DESIGN & FABRICATE TWO STAGE RC COUPLE AMPLIFIER.
2. TO DESIGN & FABRICATE RC PHASE SHIFT OSCILLATOR.
3. TO DESIGN & FABRICATE MONOSTABLE, BISTABLE AND ASTABLE MULTIVIBRATOR CIRCUITS.
4. USE OF OP-AMP AS SCALE CHANGER, ADDER, SUBTRACTOR, DIFFERENTIATOR AND INTEGRATOR.

**DIGITAL ELECTRONICS LAB:**

1. TO STUDY WORKING OF NOR & NAND LATCH.
2. TO STUDY WORKING OF D, JK, AND T FLIP FLOP.
3. TO STUDY WORKING OF MUX AND DEMUX/DECODER.

**POLICE WIRELESS COMMUNICATION COURSE-L II**  
**MODULE -V**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I, PAPER- II(A) and PAPER- II(B)
2.	PAPER -II	(A) PRACTICALS	70	
		(B) PRESENTATION	30	
		TOTAL	200	

# **POLICE WIRELESS COMMUNICATION COURSE-L II**

## **MODULE -VI (4 Weeks)**

### **THEORY:**

#### **RADIO COMMUNICATION TECHNIQUES**

SINGLE-SIDEBAND SYSTEMS: GENERATION, TRANSMITTERS, RECEIVERS, FM TRANSMITTERS AND RECEIVERS.

#### **TRANSMISSION LINE**

TRANSMISSION LINE PROPAGATION, LOSSES, INCIDENT AND REFLECTED WAVES, STANDING WAVES, INPUT IMPEDANCE.

#### **ANTENNAS AND WAVEGUIDES**

ANTENNA TERMINOLOGY AND DEFINITIONS, ANTENNA LOADING, ANTENNA ARRAYS, SPECIAL- PURPOSE ANTENNAS, ANTENNA RECIPROCITY, AND WAVEGUIDES: VARIOUS TYPES.

#### **SATELLITE COMMUNICATION**

SATELLITE ORBITS- LEO, MEO, GEO, ADVANTAGES AND DISADVANTAGES OF GEO STATIONARY ORBITS, V-SAT PARAMETERS, MULTIPLE ACCESS TECHNIQUE: FDMA, TDMA, CDMA.

#### **VHF/UHF, HF COMMUNICATION**

VHF/ UHF AND HF TRANSRECEIVERS, BLOCK DIAGRAM AND DESCRIPTION, VHF REPEATERS

#### **OPTICAL FIBER COMMUNICATION**

TYPES OF OPTICAL FIBERS-STEP AND GRADED INDEX FIBERS, BANDWIDTH OF FIBERS, SNELL'S LAW

#### **NOISE**

NOISE SOURCES, COSMIC NOISE, WHITE NOISE SHORT NOISE, TRANSIT TYPE NOISE, NOISE TEMPERATURE, NOISE REDUCTION METHOD IN RX, EMI: EFFECT OF EMI ON ELECTRONIC DEVICES: CLASSIFICATION, CAUSES OF EMI, EXAMPLES

## **POLICE WIRELESS COMMUNICATION COURSE-L II**

### **MODULE -VI**

#### **PRACTICALS:**

#### **STUDY OF WORKING PRINCIPLE & OPERATION OF FOLLOWING INSTRUMENTS:-**

1. DIGITAL MULTIMETER
2. AC MILLIVOLTMETER
3. AF POWER METER
4. RF POWER METER

#### **VHF LAB:**

1. TO STUDY TECHNICAL SPECIFICATION & BLOCK DIAGRAM OF VHF/UHF TRANSRECEIVER.
2. TO STUDY BLOCK DIAGRAM OF SYNTHESISER OF VHF/UHF TRANSRECEIVER.
3. TO STUDY KEY CONTROL CIRCUIT OF VHF/UHF TRANSRECEIVER AND ITS OPERATION.
4. TO STUDY AGC CIRCUIT OF VHF/UHF TRANSRECEIVER AND ITS OPERATION.
5. TO STUDY POWR SUPPLY CIRCUIT OF VHF/UHF TRANSRECEIVER.
6. TO STUDY ALC CIRCUIT OF TRANSRECEIVER AND ITS OPERATION.

#### **COMMUNICATION SYSTEM LAB:**

1. TO CONFIGURE DIFFERENT PARAMETERS OF VSAT SYSTEM.

**POLICE WIRELESS COMMUNICATION COURSE-L II**  
**MODULE –VI**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I, PAPER- II(A) and PAPER- II(B)
2.	PAPER -II	(A) PRACTICALS	70	
		(B) PROJECT	30	
		TOTAL	200	

**POLICE WIRELESS COMMUNICATION COURSE-L I**  
**MODULE –VII (4 Weeks)**

**THEORY**

**APPLIED MATH-III:**

INTEGRAL CALCULUS, DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMATION

**TRANSIENTS RESPONSE:**

R-L AND R-C NETWORKS; RLC NETWORKS

**ELECTRONICS DEVICES & CIRCUITS –III**

WAVESHAPING CIRCUITS, TIMER IC, MULTIVIBRATOR CIRCUITS – IC BASED, SCHMITT TRIGGER, VCO AND PLL, THYRISTORS AND UJT, REGULATED POWER SUPPLY UNIT

**DIGITAL ELECTRONICS-III**

COMBINATIONAL CIRCUITS USING MSI DEVICES, SEQUENTIAL LOGIC DESIGN, PROGRAMMABLE LOGIC DEVICES, A/D AND D/A CONVERTERS CIRCUITS

**BIPOLAR LOGIC CIRCUITS:**

TTL FAMILIES WITH IMPROVED PERFORMANCE, ECL LOGIC FAMILY, COMPARISON OF LOGIC FAMILIES, INTERFACING OF VARIOUS LOGIC FAMILIES

**MOS DIGITAL CIRCUITS:**

NMOS LOGIC CIRCUITS, CMOS LOGIC CIRCUITS, TRANSMISSION GATES

**ACTIVE FILTERS**

ADVANTAGE OF ACTIVE FILTERS OVER PASSIVE FILTERS, BUTTERWORTH AND CHEBYSHEV FILTER-FUNDAMENTALS

**MICROWAVE RADIO COMMUNICATION:**

ADVANTAGE AND APPLICATIONS OF MICROWAVES, WAVEGUIDES, MICROWAVE TUBES AND SEMICONDUCTOR DEVICES, MICROWAVE ANTENNAS. MICROWAVE SYSTEM.



# **POLICE WIRELESS COMMUNICATION COURSE-L I**

## **MODULE -VII**

### **PRACTICALS:**

#### **ELECTRONICS DEVICES AND CIRCUIT LAB:**

1. TO STUDY THE WORKING OF STANDARD SIGNAL GENERATOR.
2. TO STUDY THE WORKING OF CRO OSCILLOSCOPE.
3. TO OBSERVE THE OUTPUT WAVESHAPE OF RC CIRCUIT.
4. TO FABRICATE TIMER CIRCUIT USING 555 TIMER IC.
5. TO FABRICATE PLL & VCO CIRCUIT USING IC.
6. TO STUDY THE WORKING OF ACTIVE FILTERS.

#### **DIGITAL ELECTRONICS LAB:**

1. TO FABRICATE COMBINATIONAL CIRCUITS USING MUX, DECODER.
2. TO CONSTRUCT AND TEST A/D AND D/A CONVERTER USING IC.

**POLICE WIRELESS COMMUNICATION COURSE-L I**  
**MODULE -VII**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I AND PAPER- II
2.	PAPER -II	PRACTICALS	100	
		TOTAL	200	

**POLICE WIRELESS COMMUNICATION COURSE-L I**  
**MODULE –VIII (4 Weeks)**

**THEORY**

**PERSONAL COMPUTER ARCHITECTURE:**

BLOCK DIAGRAM

**CENTRAL PROCESSING UNIT:**

INTRODUCTION OF ADVANCED INTEL/OTHER MICROPROCESSORS

**MEMORY CHIPS AND MEMORY INTERFACING:**

MAIN MEMORY TECHNOLOGIES, ROM, EPROM, EEPROM, FLASH MEMORY, SDRAM, DRAM, MEMORY MODULES, CACHE MEMORY,

SECONDARY STORAGE MEMORIES: HARD DISK, CD-ROM, CD-RAM, DVD

**I/O DEVICES:**

KEY BOARD, MOUSE, DISPLAY DEVICES

**COMPUTER SYSTEM:**

PROGRAMMING , OPERATING SYSTEMS, OFFICE AUTOMATION -APPLICATION SOFTWARE, CREATION OF TABLES AND GRAPH FOR DATA ANYLYSIS, POLICE APPLICATION AND SOFTWARE, UTILITY SOFTWARE , ANTI-VIRUS SOFTWARE.

**COMPUTER NETWORKING:**

NETWORK ARCHITECTURE, NETWORK COMPONENTS, PROTOCOLS AND STANDARDS, OSI REFERENCE MODEL, IP ADDRESSING, SWITCHING AND MULTIPLEXING

**SECURITY EQUIPMENT:**

CCTV SURVELLIANCE, ACCESS CONTROL SYSTEM, RFID AND RADIO JAMMERS

**POLICE WIRELESS COMMUNICATION COURSE-L I**  
**MODULE -VIII**

**PRACTICALS:**

**DIGITAL ELECTRONICS LAB:**

1. TO STUDY THE OPERATION OF 8085 MICROPROCESSOR.

**PC MAINTENANCE LAB:**

1. TO IDENTIFY THE VARIOUS COMPONENTS, DEVICES AND SECTIONS OF A PC.
2. TO STUDY THE FUNCTION OF OPERATING SYSTEMS.
3. TO STUDY THE APPLICATION OF UTILITY SOFTWARES

**COMPUTER OPERATION LAB:**

1. TO CREATE DOCUMENTS USING MS-WORD/ANY OTHER APPLICATION SOFTWARE.
2. TO CREATE TABLE AND GRAPH USING MS-EXCEL OF ANY OTHER APPLICATION-SOFTWARE.

**COMMUNICATION SYSTEM LAB:**

1. TO CONFIGURE THE IP ADDRESS OF A COMPUTER.
2. TO STUDY THE CONCEPT OF COMPUTER NETWORKING.

**POLICE WIRELESS COMMUNICATION COURSE-L I**  
**MODULE –VIII**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I, PAPER- II(A) and PAPER- II(B)
2.	PAPER -II	(A) PRACTICALS	70	
		(B) PRESENTATION	30	
		TOTAL	200	

# **POLICE WIRELESS COMMUNICATION COURSE-L I**

## **MODULE -IX (4 Weeks)**

### **THEORY**

#### **DIGITAL COMMUNICATION:**

ADVANTAGE & DISADVANTAGE OF DIGITAL COMMUNICATION. BIT, BAUD, BPS DEFINITION, INFORMATION CAPACITY, DIGITAL MODULATION TECHNIQUES. PULSE MODULATION, PWM, PAM, PCM, PCM SYSTEM BLOCK DIAGRAM, SAMPLE AND HOLD CIRCUIT. SAMPLING RATE – NYQUIST SAMPLING THEOREM, DELTA MODULATION, ADAPTIVE DELTA MODULATION.

#### **DATA COMMUNICATION:**

BASIC CONCEPT, SYNCHRONOUS / ASYNCHRONOUS TRANSMISSION, DATA COMMUNICATION CODES, TRANSMISSION ERRORS, ERROR DETECTION TECHNIQUES, SWITCHING TECHNIQUES -CIRCUIT SWITCHING, MESSAGE SWITCHING AND PACKET SWITCHING. NETWORK TOPOLOGIES, VARIOUS PROTOCOLS X25, X28, X75, X400 ETC.

#### **HF COMMUNICATION:**

LATEST TRENDS IN HF COMMUNICATION, AUTOMATIC LINK ESTABLISHMENT (ALE), USE OF LINK QUALITY ANALYSIS (LQA)

#### **VHF/UHF COMMUNICATION SYSTEM:**

RADIO TRUNKING SYSTEMS, VARIOUS TYPES OF RADIO TRUNKING SYSTEMS (TETRA, APCO P25, DMR AND ANY OTHER SYSTEMS ETC)

#### **SATELLITE COMMUNICATION**

KEY TERMS, UPLINK/DOWNLINK MODEL, TRANSMISSION DELAY, VSAT COMMUNICATION

#### **OPTICAL FIBRE COMMUNICATION**

ADVANTAGE OF OPTICAL FIBRE COMMUNICATION, OPTICAL FIBRE CABLES, ELEMENTS OF OPTICAL FIBRE COMMUNICATION LINK

#### **CELL PHONE COMMUNICATION**

CELLULAR FUNDAMENTALS, GSM MOBILE SYSTEM ARCHTECTURE, CDMA MOBILE SYSTEM ARCHITECTURE

#### **TELECOMMUNICATION REGULATION**

TELEGRAPH ACT, WIRELESS ACT, IT ACT, SPECTRUM ALLOCATION POLICY AND PROCEDURE, INTERNATIONAL REGULATION ON SPECTRUM

# **POLICE WIRELESS COMMUNICATION COURSE-L I**

## **MODULE -IX**

### **PRACTICALS:**

#### **VHF AND HF LAB:**

1. TO STUDY TECHNICAL SPECIFICATION AND EVALUATION OF BASIC PARAMETERS OF VHF/UHF AND HF TRANSRECEIVERS.
2. TO RECTIFY THE COMMON FAULTS IN VHF/UHF AND HF TRANSRECEIVERS.

#### **COMMUNICATION SYSTEM LAB:**

1. MESUREMENT OF BIT ERROR RATE.
2. TO STUDY THE WORKING OF VSAT COMMUNICATION SYSTEM.
3. TO STUDY THE CONFIGURATION OF VSAT SITE PARAMETERS.
4. TO STUDY THE WORKING OF OPTICAL FIBER COMMUNICATION SYSTEM.
5. TO PLOT RADIATION PATTERN OF ANTEENA USING TRAINER BOARD KIT.
6. TO STUDY THE MICROWAVE COMMUNICATION TEST SYSTEM.
7. TO STUDY THE COMMUNICATION TEST SET FOR RADIO TRUNKING.

**POLICE WIRELESS COMMUNICATION COURSE-L I**  
**MODULE –IX**

**EXAMINATION PATTERN**

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I, PAPER- II(A) and PAPER- II(B)
2.	PAPER -II	(A) PRACTICALS	70	
		(B) PROJECT	30	
		TOTAL	200	



# **POLICE WIRELESS ORIENTATION TRAINING (PWOT)**

**Duration: 4 Weeks**

## **THEORY :**

- a) Organizational Set-up and working of State Police communication set-up.
- b) Communication Skill
- c) Radio Procedure
- d) Frequency spectrum and Wave propagation
- e) Communication Equipment & accessories
- f) HF, VHF/UHF and VSAT Communication.
- g) Radio Communication Security & PWCC.
- h) Data communication over HF, VHF/UHF and VSAT Network.
- i) Radio Trunking Systems
- j) Telecom regulation

## **PRACTICAL :**

- a) Familiarization with Communication Equipment and Instruments.
- b) Computer Operation for Communication & Office automation.
- c) Practice Sessions on HF, VHF/UHF and VSAT Communication.

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## POLICE WIRELESS ORIENTATION TRAINING (PWOT)

### EXAMINATION PATTERN

SL NO	PAPER CODE	PAPER TITLE	TOTAL MARKS	PASS MARKS
1.	PAPER -I	THEORY	100	OVERAL 50% of the TOTAL MARKS (200)  AND  40% IN INDIVIDUAL PAPER- I, PAPER- II(A) and PAPER- II(B)
2.	PAPER -II	(A) PRACTICALS	70	
		(B) PRESENTATION	30	
		TOTAL	200	

**Police Wireless Communication Course-Advance Level (PWCC-AL)**  
**(Duration –Eight Weeks)**

**THEORY**

**1. ADVANCE TELECOM TECHNIQUES AND SYSTEMS:**

**I. Digital Communication:**

Analog vs Digital Communication, Bit vs Baud, information capacity, Sample and Hold Circuit, Pulse Modulation , Delta Modulation - Block diagram & features of DM, Adaptive Delta Modulation.

**II. Data Communication:**

Basic Concept, Synchronous / Asynchronous Transmission, Data Communication Codes, Transmission Errors, Error Detection Techniques, Switching Techniques -Circuit switching , Message switching and Packet switching. Network Topologies, Various Protocols x25, x28,x75, x400 etc.

**III. Multiplexing and Access Techniques:**

Concept, Different types- FDM.& TDM , FDMA, TDMA & CDMA

**IV. Microwave Radio Communication:**

Salient features, Microwave repeaters, IF and base band repeaters, Diversity – Frequency diversity, space diversity, polarization diversity, protection, switching.

**V. Satellite Communication:**

Introduction to Satellite Communication, Antennas, VSAT Communication.

**VI. Optical Fiber Communication:**

Basics, Modes of Propagation through OFC, Merits / Demerits vis-vis other medium.

**VII. Computer Operation & Communication:**

Hardware, Operating Systems & Application Software, Database Management, Computer Networking, MODEM , Local area Network, Wide Area Network, Internet & Intranet.

**VIII. Radio Trunking Systems:**

Radio Trunking Systems, Various types of Radio Trunking Systems (TETRA, APCO P25, DMR and any other systems etc)

## **2. POLICE COMMUNICATION:**

### **I. Police Telecom systems in India:**

Importance of Communication in Police; Command, Control, Communications and Computer, Concept of "response time" Real time Communication and Store & Forward Communication, History of the growth of Police telecommunication in India. Police Communication Systems in the States, Communication systems of CPOs. Inter-State Police Wireless System, City Police Telecommunication Systems. Communication systems of other Organizations, Emergency Communication – Provision of networks for natural calamities, crowd control, VIP visits and anti-dacoity operations etc.

### **II. Equipment used in Police Telecommunication:**

Batteries, Antennas, High Frequency Transmitters & Receivers, VHF Transceivers for Mobile and static use, Specifications of Communication Equipment, Procedures for testing and evaluation of equipment, Procedure for procurement & condemnation of equipment, Test Instruments.

Modern Equipment: IDT, EPABX, Cryptographic Machines, SECTEL, SECFAx etc.

## **3. PLANNING OF POLICE NETWORK**

### **I. System Planning and Installation:**

Propagation of electromagnetic waves: HF, VHF/UHF and Microwave. Selection of frequencies, Sharing of frequencies, Interference and Preventive measures, Profile survey for microwave communication. Network Planning – Grid working and point-to-point working, Simplex, duplex systems, selective calling, broad-casting Systems; Power output, bandwidth, modulation and maintenance considerations.

### **II. Aerial installations:**

Different types of an aerals for grid working,

Directive aerals for point-to-point communication in HF and VHF,

### **III. Maintenance and repair of communication equipment:**

Planning, storage and procurement of spare parts, preventive Maintenance, Central, Zonal and mobile maintenance Workshops, High grade instruments required for maintenance, tool kits, Test racks etc.,

#### 4. RADIO COMMUNICATION PROCEDURE AND SECURITY

##### I. Communication Procedure:

Police Wireless procedures (R/T), Signal Centre Procedure, Guidelines for the users and Scrutiny of traffic.

##### II. Signal Security :

Need for signal security, classified and unclassified information and security grading, procedure for handling of classified traffic, cryptographic, basic principles and systems in use, introduction of cryptography-handling of crypto-documents and setting of crypto-centres, cryptographic machines-basic principles and features of existing machines, crypto-phonic devices-basic principles and features of existing machines.

#### 5. POLICE COMMUNICATION TRAINING

Need of Training in Police Telecommunication, Designing of various Courses, Training methodology with special reference to use of audio-visual aids. Human Resource Development

#### 6. FUTURE TECHNOLOGIES

##### I. Scanning of the latest trends of Wireless Technology:

WiMax, 4G, Long Term Evaluation (LTE) etc.

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**Police Wireless Communication Course-Advance Level**  
**(Duration –8 Weeks)**

**PRACTICALS:**

**DIGITAL ELECTRONICS LAB:**

1. TO FABRICATE COMBINATIONAL CIRCUITS USING MUX, DECODER.
2. TO STUDY WORKING OF D, JK, AND T FLIP FLOP.
3. TO CONSTRUCT AND TEST A/D AND D/A CONVERTER USING IC.

**VHF AND HF LAB:**

1. TO STUDY TECHNICAL SPECIFICATION AND EVALUATION OF BASIC PARAMETERS OF VHF/UHF AND HF TRANSRECEIVERS.
2. TO RECTIFY THE COMMON FAULTS IN VHF/UHF AND HF TRANSRECEIVERS.
3. ANTENNA INSTALLATION OF HF AND VHF COMMUNICATION

**COMMUNICATION SYSTEM LAB:**

1. TO STUDY THE WORKING OF VSAT COMMUNICATION SYSTEM.
2. TO STUDY THE CONFIGURATION OF VSAT SITE PARAMETERS.
3. TO STUDY THE WORKING OF OPTICAL FIBER COMMUNICATION SYSTEM.
4. TO PLOT RADIATION PATTERN OF ANTEENNA USING TRAINER BOARD KIT.
5. TO STUDY THE MICROWAVE COMMUNICATION TEST SYSTEM.
6. TO STUDY THE COMMUNICATION TEST SET FOR RADIO TRUNKING.

**PC MAINTENANCE LAB:**

1. TO STUDY THE FUNCTION OF OPERATING SYSTEMS
2. TO CONFIGURE THE IP ADDRESS OF A COMPUTER.
3. TO STUDY THE CONCEPT OF COMPUTER NETWORKING.

## Police Wireless Communication Course-Advance Level (PWCC-AL)

### EXAMINATION PATTERN

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For any query / clarification:

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