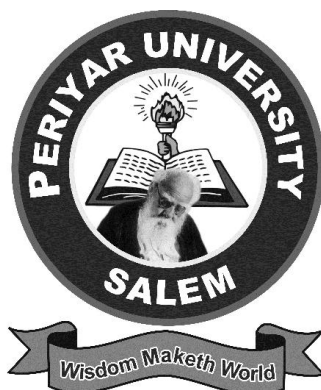# PERIYAR UNIVERSITY

## SALEM – 636 011



# PERIYAR INSTITUTE OF DISTANCE EDUCATION

## (PRIDE)

## P.G. DIPLOMA IN TELECOMMUNICATION

NON-SEMESTER

## REGULATION AND SYLLABUS

(Effective from the academic year 2008 – 2009 and thereafter)

**OBJECTIVE OF THE COURSE**:

The PG Telecommunication syllabus will enhance the student's knowledge in the fields of Wire communication, Optical communication, Wireless communication, Satellite communication and Computer communications.

The course globally covers the specialized areas in the field of Fiber optics ,ISDN, Broad band ISDN ,Voice over IP and Video conferencing ,it is aimed at making the students more employable. The course is also helpful to those whose are currently working in the telecommunication fields.

## 1.     CONDITION FOR ADMISSION:

A candidate who has passed **any degree of this University** or **any of the degree** of any other University accepted by the syndicate as equivalent thereto subject to such conditions as may be prescribed therefore shall be permitted to appear and qualify for the **Post Graduate Diploma in Telecommunication degree** examination of this University after a course of study of **ONE** academic year.

## 2.     DURATION OF THE COURSE:

The course for the Post Graduate Diploma in **Telecommunication** shall consist of one academic year.

## 3.     ELIGIBILITY :

A candidate shall be eligible for the P.G. Diploma in Telecommunication if he/she has satisfactorily undergone the prescribed course of study for a period of not less than one year and passed the examinations in all the papers.

4.    **COURSE OF STUDY**

The course of study shall comprise instruction in books prescribed from time to time.

- **COMMUNICATION SYSTEMS**
- **BASICS OF TELECOMMUNICATION**
- **DATA COMMUNICATION**
- **FIBER OPTICS AND SATELLITE COMMUNICATION**
- **ADVANCED NETWORKS**
- **MOBILE COMMUNICATION**
- **ADVANCED COMMUNICATION ENGINEERING**
- **PRACTICAL-I ANALOG AND BASIC COMMUNICATION LAB-I**
- **PRACTICAL-II COMMUNICATION LAB-II**
- **PROJECT:VIVA-VOCE**

5.    **EXAMINATIONS :**

The examination shall be three hours duration to each paper at the end of the year. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination. Practical Examination should be conducted at the end of the year.

**6. EMPLOYMENT OPPORTUNITIES**:

- Telecommunication Industries
- Telephone Exchanges
- Satellite communication centers
- Optical communication areas
- Wireless communication centers
- Military communication centers
- Cell phone manufacturing Industries
- Cell phone control room Engineer.

**6. SCHEME OF EXAMINATIONS:**

| S.NO | SUBJECT | SUBJECT | MARKS |
|------|---------|---------|-------|
| 01 | 08PDTE01 | COMMUNICATION SYSTEMS | 100 |
| 02 | 08PDTE02 | BASICS OF TELECOMMUNICATIONS | 100 |
| 03 | 08PDTE03 | DATA COMMUNICATION | 100 |
| 04 | 08PDTE04 | FIBER OPTICS AND SATELLITE COMMUNICATION | 100 |
| 05 | 08PDTE05 | ADVANCED NETWORKS | 100 |
| 06 | 08PDTE06 | MOBILE COMMUNICATION | 100 |
| 07 | 08PDTE07 | ADVANCED COMMUNICATION ENGINEERING | 100 |
| 08 | 08PDTEP01 | PRACTICAL-I ANALOG AND BASIC COMMUNICATION LAB-I | 100 |
| 09 | 08PDTEP02 | PRACTICAL-II COMMUNICATION LAB-II | 100 |
| 10 | 08PDTEPR01 | PROJECT:VIVA-VOCE | 200 |
| **TOTAL MARKS** | | | **1100** |

## 7. QUESTION PAPER PATTERN

### For theory:

TIME: 3 Hrs                                          MAX.MARKS:100

PART-A(5x5=25)

(answer all the questions  )

(Two questions from each unit with internal choice)

PART-B(5x15=75)

(answer all the questions  )

(Two questions from each unit with internal choice)

### For practical:

**(Answer  any one)**

TIME: 3 Hrs                                          MAX.MARKS:100

**Mark distribution**:

| | |
|---|---|
| Circuit | =40 marks |
| Experiment work | = 40 marks |
| Correct output | = 20 marks |

## 8.  PASSING MINIMUM:

A candidate shall be declared to have passed the examination in a theory/practical of study only if he /she scores not less than **50 marks** out of 100 in the university Examination.

## 9.  CLASSIFICATION OF SUCCESSFUL CANDIDATES:

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in **First class.** All other successful candidates shall be declared to have passed in second class. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in **First class with distinction** provided they pass all the examinations prescribed for the course at the first appearance.

# PAPER: 1 COMMUNICATION SYSTEMS

### Unit – I    Communication Process

Elements of a communication system – Sources of information – Transmission and Reception of a signal – Basic antennas – Analog and digital types of communication.

### Unit – II    Amplitude and Frequency Modulation

Definition of Amplitude modulation – Generation and detection of AM – SSB / DSB VSB modulation–AM radio transmitter and receiver-Definition of Frequency modulation – FM generation and demodulation – Block diagram of FM radio transmitter and receiver.

### Unit – III   Pulse Modulation

Sampling theorem – Basic principles of pulse Amplitude modulation – Pulse width modulation – Pulse position modulation –Multiplexing- FDM-TDM-WDM.

### Unit – IV    PCM and Basics of data Transmission and Reception

Principle of PCM – Quantization and quantization error Delta Modulations – Adaptive delta modulation – Time division multiplexing in PCM – Coherent reception – Binary ASK, - FSK – PSK-Comparison of ASK, FSK, PSK.

### Unit – V    Microwave Devices

Introduction to microwave system – Frequency range – Waveguides (qualitative analysis only) – Cavity resonators – Two cavity Klystron – Reflex klystron – Magnetron – Traveling wave tube –Gun diode.

**TEXT BOOKS**

1. Fundamentals of communication systems – Sanjeeva Gupta, Kanna publishers,2000.
2. Principles of communication system – Anok Singh, Published by Chand, 1999.

**REFERENCE BOOKS**

1. Electronics communication Systems -  George Kennedy Published by Mc-Graw Hill Educations,1992.
2. Principles of communication systems – Herbert Taub and  Donald L Schilling, Published by Wiley,2001.
3. Communication systems – Simon Haykins, Published by Mc-Graw Hill Educations,1986.

# PAPER:2  BASICS OF TELECOMMUNICATION

## Unit -1

### An over view of Telecommunication:

Introduction-History of telecommunication-telecommunication network-Internet – Internet protocol-Classification of data network—Telecommunication standards.

## Unit –II

### Electronics for telecommunication:

Introduction-Communication system parameters- FDM –TDM-WDM.

Transmission media; introduction – Fiber optic cables- Cabling architecture.

## Unit –III

### Voice communication:

Introduction- Public telephone network-The telephone types-Circuit – Out going – Incoming calls-line signaling –Intelligent network services- Business telephone systems-ISDN architecture.

## Unit- IV

### Wide area network and broad band technologies:

Introduction –Packet switchingnetwork-X.25-Frame relay-SMDS-ISDN-SONET-ATM-POS-DTM-DSL-CMs-PON.

## Unit –V

### Network management:

Introduction-Policy management-Evolution of network hardware and software-Network administration and maintenance-Network security-Configuration management – Telecommunication management network.

**TEXT BOOKS**

1.  Introduction to telecommunication-Gokhale-Delmar- Thomson, 1998.

**REFERENCE BOOKS**

1.  Telecommunicatin switching , traffic networks – JE Flood – pearson – eight ed 2003.
2.  Telecommunication switching systems and networks – thiyagarajan viswanath- PHI 2002- First edn.
3.   Introduction to telecommunication –marion cole – pearson – 2 nd edn 2006.

# PAPER: 3 DATA COMMUNICATION

**Unit – I:**

Introduction- Data Communication: Components- Protocols and standards: Protocols-Standards- Standards organizations: Standards Creation Committees-Forums-Regulatory Agencies.

Basic Concepts- Line configuration: Point-to-Point-Multipoint-Topology: Mesh, Star, Tree, Bus, Ring, Hybrid Topologies-Transmission Mode: Simplex-Half Duplex-Full Duplex.

**Unit – II:**

**The OSI Model & Signals:** The Model: Layered Architecture-Functions of the layers: Physical -Data link -Network -Transport -Session -Presentation -Application -Analog signals: Simple Analog Signals-Complex signals-Frequency spectrum and Band width-Digital signals: Amplitude, Period and Phase-Decomposition of a Digital signal.

**Transmission Media:** Guided Media: Twisted-Pair Cable-Coaxial Cable-Optical Fiber-Unguided media: Radio Frequency Allocation-Propagation of Radio Waves-Terrestrial Microwave-Satellite Communication-Cellular Telephony-Modems: Transmission Rate-Modem Standards.

**Unit – III:**

**Multiplexing:** FDM, TDM, Inverse Multiplexing- Error detection and correction: Types of Errors: Single Bit Error-Multiple bit Error-Burst Error-Detection: Redundancy-VRC-LRC-CRC-Error correction: Single Bit Error correction-Hamming Code-Multiple Bit Error Correction.

**Data link control & Protocols:** Flow control: Stop and Wait-Sliding Window-Error control: ARQ-Stop and Wait ARQ-Sliding Window ARQ-Bit oriented protocols: HDLC-Frames-More about Frames-Link Access Procedures.

**Unit – IV:**

**Local Area Network (LAN):** IEEE 802.1-Ethernet: CSMA/CD-Addressing-Electrical Specification-Token bus-Token Ring: Token Passing-Addressing-Electrical Specification- FDDI: Token Passing-Addressing-Electrical Specification.

**X.25 interface:** X.25 layers: Physical-Data link-Network-Packet layer protocol: Information packets-Control packets.

**Unit – V:**

Internet Working: Repeaters- -Bridges: Types of Bridges-Routers: Routing Concepts.

Transport & Upper OSI layers: Connection: Connection Establishment-Connection Termination-The OSI transport protocol: Transport Classes-TPDU-Connection oriented and Connectionless Services-Session layer: Session and Transport Interaction-Synchronization Points-Session Protocol Data Unit-Presentation layer: Translation-Encryption/Decryption.

**TEXT BOOKS**

1.) Data Communication and Networking – Behrouz Forouzan.Tata McGraw-Hill Edition 1999.

2.) Data Communication – Prakash.C.Gupta-Prentice-Hall of India.Pvt.Ltd-New Delhi-1996-EEE.

**REFERENCE BOOKS**

1.)Data Communication and Networking – Dr. Madhulika Jain & Satish Jain, IST Indian Edition-2000-BPB Publications-New Delhi.

2.)Data Network Communications – Michael.A.Miller (This Edition Exclusively distributed in India by Vikas Publishing House.Pvt.Ltd-New Delhi.

3.)Data and Computer Communications – William Stallings- IVth Edition-EEE-Macmillan Publishing Company-1994.

4.)Data and Computer Communications – William Stallings- Vth Edition-EEE-Prentice-Hall of India.Pvt.Ltd-New Delhi-1997.

# PAPER 4: FIBER OPTICS AND SATELLITE COMMUNICATION

**Unit-I**

Glass fiber fabrication : direct melting- high purity silica fibers by vapour deposition-cable design-splicing methords-connectors-fiber measurements-attenuation-dispersion- index profile.

**Unit-II**

Optical source and transmitter circuits;LED-LASER diodes-developments in LASER diode strectures for photonic systems-DFB lasers-transmitter circuits.

**Unit-III**

Optical detectors and circuits : theory of solid state photo diodes – statistical view point of optical detection – avalanche photo diode – receiver sensitivity and bit error rate – receiver design.

**Unit-IV**

Photonic switching: photonic switching architecture – characteristics of photonic switching architecture – types of photonic switches – trends in photonic switching – fibers in telecommunication network-HDTV-HDTV on optical fiber.

**Unit-V**

Introduction to satellite communication :Satellite orbits-satellite communication systems – satellite sub systems – earth stations – applications : survellane – navigation – mobile communication- TV broadcasting – satellite radio- satellite telephone –internet services.

**TEXT BOOKS**

1.Optical fiber communication(principle and design)- A.Selvarajan S.Sekar T,Srinivas., Tata Mc Hill.

2. Telecommunication systems (Aassaam learning sereies) – KR.Thenammai T. Mahadevan., publisher : R. Mahedeva for assam education.

**REFERENCE BOOKS**

1.Communication systems – R.Kumar., Anuradha agencies – Ist edn.

2. Optical fiber communication – keiser ., Tata Mc Hill.

3,Wireless communication technology- Blake .,Thomson.

# PAPER: 5 ADVANCED NETWORKS

**Unit-I**

Data transmission – Concepts – Analog and digital data transmission- Transmission impairments – Switching - Circuit Switching – Packet Switching.

**Unit-II**

Frame Relay – Protocol architecture – Call control – User data transfer – Network function – Congestion control. ATM - Protocol architecture – ATM logical connections – ATM Cells & transmission – ATM adaptation Layer – Transfer and Congestion control.

**Unit-III**

Internet security – Overview – Shortest path Length determination – Distance vector protocol – Link State protocol – Path- vector protocol – Multicasting.

**Unit-IV**

Quality of Service in IP networks – Integrated service architecture (ISA)- Queuing Discipline  -Random early detection- Diffrentiated services- Protocols for QoS Support – RSUP – Multiprotocol label switching – Real time transport protocol.

**Unit-V**

Multimedia: Digitizing Audio and Video - Audio and Video Compression – Steaming stored and Live Audio and Video-Real Time Transport Protocol (RTP) - RTCP-Voice over IP

**TEXT BOOKS**

1.    William Stallings – High speed networks and Internets performance and Quality of services – PHI –Second Edition 2002
2.    Behrouz A Forouzan – Data Communications and Networking – TMH - Third Edition 2003.

**REFERENCE BOOKS**

1. William Stallings – Data and Computer communications – PHI -Fifth Edition 2001

2. S.Tenenbaum – Computer Networks – PHI – Third Edition 1998.

3. Rainer Handel – ATM Networks concepts and protocols applications –Pearson Education – Third Edition 2002.

4. Black – Computer Networks Protocols, Standards and Interfaces – PHI- Second Edition -1993.

# PAPER : 6   MOBILE COMMUNICATION

## Unit-I

Wireless MANS, LANS and PANS – OSI model. TCPL & P Protocol, TCP over wireless – Ipv6.

## Unit-II

**Multiple Division Techniques :** FDMA – TDMA – CDMA – OFDM - SDMA – AM – FM – FSK – PSK – QPSK - $\prod/4$ QPSK – QAM – 16QAM.

## Unit-III

Channel Allocation & sensor networks static Allocation Vs Dynamic Allocation – FCA – DCA – HCA – Allocation in Specialized system structure – System modeling – Characteristics of MANET – Routing – Table Driver Routing Protocol Source Initialed on Demand Routing – Hybrid Protocols – Wireless sensor networks – Arced wireless sensor networks.

## Unit-IV

Cellular Concept Mobile Communication System Cell Area – Signal strength & cell parameters – Capacity of a cell – Frequency Reuse – How to form a cluster co channel Interference – Cell Splitting – Cell Sectoring Cellular System Infrastructure – Registration – Handoff Parameters & under laying Support – Roaming Support – Multicasting – Security & Privacy – firewalls & system security.

## Unit-V

Recent Advances UWB Technology – Multimedia Service Requirements push to Talk Technology – Mobility & Resource Management for Integrated System – Multicast in wireless networks – Bluetooth networks – Threats & Security issues.

**TEXT BOOKS**

1. Introduction to wireless & mobile system – second edition 2006– Dharma prakesh Agrawal. Qing-AN-Zong Rahul print O pack, Delhi.

**REFERENCE BOOK**

1)      Mobile communication – second edition 2003 – Jo chen schiller
2)      Mobile cellular Telecommunications – Analog & Digital system – second
        edition 1995  - William C.y.Lee.
3)      Mobile wireless Design Essentials – third edition 2003  -Martyn Mallick.

## PAPER 7: ADVANCED COMMUNICATION ENGINEERING

**Unit-I**

**Fundamental concepts of data communication:**

Introduction – Data communication codes-Bar codes –Error control-Error detection –Error correction –Character synchronization –Line control circuits

**Telephone Instruments and signals:** Introduction-The subscriber loop-standard telephone set-Basic telephone call procedures-Call progress tone and signals-cordless telephone –Caller ID – Electronic telephones.

**Unit -II**

**Telephone circuit**

Introduction –The local subscriber loop – Telephone message – Channel noise and noise weighting-Units of power measurements –Transmission parameters and private line circuits –Voice frequency circuit arrangements –Cross talk.

**The public telephone network**

Introduction-Telephone transmission system environment – The public telephone network-Instruments – Local loops trunk circuits and exchanges-Automated central office switches and exchanges.

**Unit-III**

**Cellular telephone concept**:

Introduction – Mobile phone service –Evolution of cellular phone –Cellular phone frequency reuse-Interference-Cell splitting, sectoring, segmentations and dualization-Cellular system topology – Roaming and handoffs-Cellular telephone network components –Cellular telephone call processing .

**Cellular telephone system**:

Introduction-First generation analog phones-Personal communication systems – Second generation cellular phones-Digital cellular phone – Global system for mobile communication.

**Unit –IV**

**Microwave radio communications and system gain:**

Introduction-Advantages and disadvantages of microwave radio-Analog versus digital microwave-FM microwave radio stations –Microwave repeater radio stations –Microwave radio system gain.

**Unit -V**

**Satellite communications**

Introduction- History of satellites –Keplers' law- Satellite orbits –Geosynchronous orbits –Antenna look angles –Satellite classifications ,spacing and frequency allocation- Satellite antenna radiation pattern.Satellite multiple –Accessing arrangements:

Introduction- FM satellite systems –Multiple accessing –Channel capacity-satellite radio navigation.

**TEXT  BOOKS**

1. Advanced electronic communications systems –Tomasi-sixth edition- PHI, 2004.

**REFERENCES BOOKS**

1. Telecommunication switching systems and networks – thiyagarajan viswanath- PHI 2002- First edn.

2. Introduction to telecommunication –marion Cole – Pearson – 2 nd end 2006.

## PAPER 8: ANALOG AND BASIC COMMUNICATION LAB-I
### (ANY 10 –EXPERIMENTS)

1. Regulated power supply using zener diode

2. IC regulated power supply

3. R.C coupled amplifier – single stage

4. Hartley oscillator – Transistor

5. Colpitts oscillator – Transistor

**6.** Phase shift oscillator

7. Inverting amplifier / Non – Inverting amplifier

8. D/A Converter using ladder op-amp

9. Voltage integrator / Differentiator

10.     Astable Multivibrator using op-amp

11.      Monostable  Multivibrator  using op-amp

12.     Sine Wave generator using op-amp

13.     Basic filters using op-amp

14.     AM modulation and detection

15.     FM modulation and detection

16.      PAM modulation and demodulation

17.     Voltage controlled oscillator

18.     Study of Satellite operations and frequency

## PAPER :9: PRACTICAL-II:COMMUNICATION LAB-II
## (ANY 10 –EXPERIMENTS)

1. LED characteristics
2. LASER characteristics
3. Photo detector characteristics
4. Fiber to fiber link
5. Fiber losses
6. Study of optical fiber
7. Optical fiber transmission and reception
8. Measurements of numerical aperture
9. Characteristics of Gunn diode oscillator
10. Study of directional couple
11. Study of MAGIC TEE
12. Study of HORN ANTENNA
13. TDM pulse amplitude modulation and demodulation
14. RF Transmitter
15. RF Receiver
16. Characteristics of optical fiber
17. Study satellite communication
18. Study of RADAR communications

## PAPER 10: PROJECT:VIVA-VOCE
**\*\*\*END\*\*\***