JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. IN WIRELESS AND MOBILE COMMUNICATIONS.
EFFECTIVE FROM ACADEMIC YEAR 2017- 18 ADMITTED BATCH

COURSE STRUCTURE AND SYLLABUS

I Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-1	Wireless Communications & Networks	25	75	4	0	0	4
PC-2	Random Processes and Time Series Analysis	25	75	4	0	0	4
PC-3	Advanced Data Communications	25	75	4	0	0	4
PE-1	Detection and Estimation Theory Radio Navigational Aids Coding Theory and Techniques	25	75	**3**	0	0	3
PE-2	Voice over Internet Protocol Queuing Theory and Applications TCP/IP Internetworking	25	75	**3**	0	0	3
OE-1	***Open Elective – I**	25	75	3	0	0	3
Laboratory I	Wireless Communications and Networks Lab	25	75	0	0	3	2
Seminar I	Seminar	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

II Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-4	Advanced Communication Systems	25	75	4	0	0	4
PC-5	Spread Spectrum Communications	25	75	4	0	0	4
PC-6	Adhoc Wireless Networks	25	75	4	0	0	4
PE-3	Optical Communications and Networks Wireless LANs and PANs Wireless Sensor Networks	25	75	**3**	0	0	3
PE4	Network Security and Cryptography Software Defined Radio 3G Networks	25	75	**3**	0	0	3
OE-2	***Open Elective – II**	25	75	3	0	0	3
Laboratory II	Advanced Communications Lab	25	75	0	0	3	2
Seminar II	Seminar	100	0	0	0	3	2
Total		**275**	**525**	**21**	**0**	**6**	**25**

III Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Technical Paper Writing	100	0	0	3	0	2
Comprehensive Viva-Voce	0	100	0	0	0	4
Project work Review II	100	0	0	0	22	8
Total	**200**	**100**	0	**3**	22	**14**

IV Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Project work Review III	100	0	0	0	24	8
Project Evaluation (Viva-Voce)	0	100	0	0	0	16
Total	**100**	**100**	**0**	**0**	**24**	**24**

***Open Elective subjects must be chosen from the list of open electives offered by OTHER departments.**

 # For Project review I, please refer 7.10 in R17 Academic Regulations.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

WIRELESS COMMUNICATIONS & NETWORKS (PC-1)

UNIT -I

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring .

UNIT –II

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III

Mobile Radio Propagation: Small –Scale Fading and Multipath: Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT -IV

Equalization and Diversity: Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT -V

Wireless Networks: Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access

Control, Comparision of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

TEXT BOOKS:

1. Theodore, S. Rappaport, "Wireless Communications, Principles, Practice", 2nd Ed., 2002, PHI.
2. Andrea Goldsmith, "Wireless Communications", 2005 Cambridge University Press.
3. KavehPahLaven and P. Krishna Murthy, "Principles of Wireless Networks ", 2002, PE
4. Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson Education, 2012.

REFERENCE BOOKS:

1. Kamilo Feher, "Wireless Digital Communications", 1999, PHI.
2. William Stallings, "Wireless Communication and Networking", 2003, PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

RANDOM PROCESSES AND TIME SERIES ANALYSIS (PC-2)

UNIT -I

Stationary Random Processes from a Probability Point of View: Probability Density and Probability Distribution Functions of a Random Variable, Expected Value of Random Variable, Markov and Chebyshev Inequalities, Computer Methods for Generating Random Variables, Multidimensional Random variables, Chi-square tests of hypotheses concerning distribution.

UNIT -II

Random Processes Analyzed in the Time Domain: Continuous and Discrete Time, Stationarity, Auto Covariance and Auto Correlation functions, Continuity, differentiation, Integrals of Random Processes.

Some special cases: The Poisson process, the Normal (Gaussian) Process.

UNIT -III

Random Processes Analyzed in the Frequency Domain: The Fourier Transform, Spectral Density, The Cross Power Spectral Density.

Linear Systems with random input: Impulse response, Transfer function, the relation between the spectral density for the input and for the output

UNIT -IV

Markov Chains: Markov Processes: Discrete time Markov chains, state transition probability matrix, n-step state transition probability, transition diagrams, classification of states, limiting state probabilities, Continuous-time Markov chains, Gambler's ruin as a Markov chains

UNIT -V

Basic Queuing Theory: Elements of a Queuing System, Little's Formula, M/M/1, Queue- Delay Distribution in M/M/1 System, M/M/1 System with Finite Capacity, M/G/1 Queueing system- Residual Service Time, Mean Delay in M/G/1 Systems.

TEXT BOOKS:

1. Peebles, P. Z, "Probability, Random Variables, and Random Signal Principles", 1993, Third Edition, McGraw-Hill
2. Oliver C. Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 2009
3. Alberto Leon-Garcia, "Probability and Random Processes for Electrical Engineering", 2nd Ed, Pearson

REFERENCE BOOKS:

1. Athanasios Papoulis, S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", TMH, 2008
2. Henry Stark, John W. Woods, "Probability and Random Processes with Applications to Signal Processing", 3rd Edition, Pearson
3. Roy D. Yates, David J. Goodman, "Probability and Stochastic Processes – A Friendly Introduction for Electrical and Computer Engineers", John Wiley & Sons.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

ADVANCED DATA COMMUNICATIONS (PC-3)

Unit - I

Data Communications, Networks and Network Types, Internet History, Standards and Administration, Protocol Layering, TCP/IP protocol suite, OSI Model. Digital Data Transmission, DTE-DCE interface.
Data Link Layer: Introduction, Data Link Layer, Nodes and Links, Services, Categories of Links, sub layers, Link Layer Addressing, Address Resolution Protocol.

Unit - II

Error Detection and Correction: Types of Errors, Redundancy, detection versus correction, Coding Block Coding: Error Detection, Vertical redundancy cheeks, longitudinal redundancy cheeks, Error Correction, Error correction single bit, Hamming code.
Cyclic Codes: Cyclic Redundancy Check, Polynomials, Cyclic Code Encoder Using Polynomials, Cyclic Code Analysis, Advantage of Cyclic Codes, Checksum
Data Link Control: DLC Services, Data Link Layer Protocols, HDLC, Point to Point Protocol

Unit - III

Switching: Introduction to Switching, Circuit Switched Networks, Packet Switching, Structure of switch
Multiplexing : Multiplexing, Frequency Division Multiplexing, Time Division Multiplexing.
Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, Backbone Networks.
Wired LANS: Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet, 10 Giga bit Ethernet

Unit - IV

Media Access Control (MAC) Sub Layer
Random Access, ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA),Controlled Access- Reservation, Polling- Token Passing, Channelization - Frequency Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA).
Spectrum Spreading: Spread Spectrum-Frequency Hopping Spread Spectrum and Direct Sequence Spread Spectrum.

Unit - V

Networks Layer: Packetizing, Routing and Forwarding, Packet Switching, Network Layer Performance, IPv4 Address, Address Space, Classful Addressing, Classless Addressing, Dynamic Host Configuration Protocol (DHCP), Network Address Resolution(NATF), Forwarding of IP Packets, Forwarding based on Destination Address, Forwarding based on Label, Routing as Packet Switches.
Unicast Routing : Introduction, **Routing Algorithms**-Distance Vector Routing, Link State Routing, Path Vector Routing, **Unicast Routing Protocols**- Routing Information Protocol(RIP), Open Short Path First Version 4.

TEXT BOOKS:

1. B. A. Forouzan, “Data Communications and Networking”, 5th, 2013, TMH.
2. William Stallings, “Data and Computer Communications”, 8th ed., 2007, PHI.

REFERENCE BOOKS:

1. Prakash C. Gupta, “Data Communications and Computer Networks”, 2006, PHI.
2. B. A. Forouzan, “Data Communications and Networking”, 2nd, 2013, TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

DETECTION AND ESTIMATION THEORY (PE-1)

UNIT –I

Random Processes: Discrete Linear Models, Markov Sequences and Processes, Point Processes, and Gaussian Processes.

UNIT –II

Detection Theory: Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error with and without equal a priori probabilities, Neyman-Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypotheses.

UNIT –III

Linear Minimum Mean-Square Error Filtering: Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, Kalman Filters.

UNIT –IV

Statistics: Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT –V

Estimating the Parameters of Random Processes from Data: Tests for Stationarity and Ergodicity, Model-free Estimation, Model-based Estimation of Autocorrelation Functions, Power Special Density Functions.

TEXT BOOKS:

1. K. Sam Shanmugan & A.M. Breipohl, “Random Signals: Detection, Estimation and Data Analysis”, Wiley India Pvt. Ltd, 2011.
2. Lonnie C. Ludeman, “Random Processes: Filtering, Estimation and Detection”, Wiley India Pvt. Ltd., 2010.

REFERENCE BOOKS:

1. Steven.M.Kay, “Fundamentals of Statistical Signal Processing: Volume I Estimation Theory”, Prentice Hall, USA, 1998.
2. Steven.M.Kay, “Fundamentals of Statistical Signal Processing: Volume I Detection Theory”, Prentice Hall, USA, 1998.
3. Srinath, Rajasekaran, Viswanathan, “Introduction to Statistical Signal Processing with Applications”, 2003, PHI.
4. Louis L.Scharf, 1991, “Statistical Signal Processing: Detection, Estimation and Time Series Analysis “, Addison Wesley.
5. Harry L. Van Trees, “Detection, Estimation and Modulation Theory: Part – I”, 2001, John Wiley & Sons, USA.
6. Mischa Schwartz, Leonard Shaw, “Signal Processing: Discrete Spectral Analysis – Detection & Estimation”, 1975, McGraw Hill.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

RADIO NAVIGATIONAL AIDS (PE-1)

UNIT –I

Navigational Systems: Review of Navigational Systems: Aircraft navigational system. Geometry of the earth.Navigation equation.Navigation errors.Radio navigation system types and Performance parameters.ILS System, Hyperbolic navigation systems, Loran, Omega, Decca Radio direction finding, DME.TACAN and VORTAC.

UNIT –II

Inertial Navigation: Inertial navigation system. Sensing instruments: Accelerometer. Gyro- copes, Analytic and Gimbaled platforms. Mechanization.Error analysis, Alignment.

UNIT –III

Global Positioning System (GPS) for Navigation: Overview of GPS, Reference systems. Satellite orbits, Signal structure, Geometric dilution of precision (GDOP), or Precision dilution of recision (PDOP), Satellite ephemeris, Satellite clock, Ionospheric group delay.Tropospheric group delay, Multipath errors and Receiver measurement errors.

UNIT –IV

Differential GPS and WAAS: Standard and precise positioning service local area DGPS and Wide area DGPS errors. Wide Area Augmentation System (WAAS) architecture.Link budget and Data Capacity, Ranging function, Precision approach and error estimates.

UNIT –V

GPS Navigational Application: General applications of GPS, DGPS, Marine. Air and Land Navigation, Surveying, Mapping and Geographical information systems, Military and Space.

TEXT BOOKS:

1. Myron Kavton and Walter Friend, R, “Avionics Navigation Systems”, Wiley,1997
2. Parkinson B.W. Spilker, “Global Positioning System Theory and Applications”, Progress in Astronautics, Vol. I and II, 1996.

REFERENCE BOOKS:

1. Hoffman. B., Wellenhof. H. Lichtenegger and J. Collins, “GPS Theory and Practice”, Springer Verlang Wien New York, 1992.
2. Elliot D. Kaplan, “Understanding GPS Principles and Applications”, Artech House. Inc., 1996.
3. Lieck Alfred, “GPS Satellite Surveying”, John Wiley, 1990.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

CODING THEORY AND TECHNIQUES (PE-1)

UNIT – I

Coding for Reliable Digital Transmission and storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT - II

Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT – III

Convolution Codes: Encoding of Convolution Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT – IV

Turbo Codes: LDPC Codes- Codes based on sparse graphs, Decoding for binary erasure channel, Log-likelihood algebra, Brief propagation, Product codes, Iterative decoding of product codes, Concatenated convolutional codes- Parallel concatenation, The UMTS Turbo code, Serial concatenation, Parallel concatenation, Turbo decoding

UNIT - V

Space-Time Codes: Introduction, Digital modulation schemes, Diversity, Orthogonal space- Time Block codes, Alamouti's schemes, Extension to more than Two Transmit Antennas, Simulation Results, Spatial Multiplexing : General Concept, Iterative APP Preprocessing and Per-layer Decoding, Linear Multilayer Detection, Original BLAST Detection, QL Decomposition and Interface Cancellation, Performance of Multi – Layer Detection Schemes, Unified Description by Linear Dispersion Codes.

TEXT BOOKS:

1. Shu Lin, Daniel J.Costello,Jr, "Error Control Coding- Fundamentals and Applications", Prentice Hall, Inc.
2. Man Young Rhee, "Error Correcting Coding Theory",1989, McGraw-Hill

REFERENCE BOOKS:

1. Man Young Rhee, "Error Correcting Coding Theory"-1989, McGraw Hill Publishing.
2. Bernard Sklar, "Digital Communications-Fundamental and Application", PE.
3. John G. Proakis, "Digital Communications", 5th ed., 2008, TMH.
4. Salvatore Gravano, "Introduction to Error Control Codes", oxford
5. Todd K.Moon, "Error Correction Coding – Mathematical Methods and Algorithms", 2006, Wiley India.
6. Ranjan Bose, "Information Theory, Coding and Cryptography", 2nd Edition, 2009, TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

VOICE OVER INTERNET PROTOCOL (PE-2)

UNIT –I

Overview of IP Protocol Suite: The Internet Protocol, The Transmission Control Protocol (TCP), The User Datagram Protocol (UDP), The Real-time Transport Protocol (RTP), IP multicast, IP version 6 (IP v6), Interworking IPv4 and IPv6, The VoIP Market, VoIP Challenges.

UNIT -II

H.323 and H.245 Standards: The H.323 Architecture, Call Signaling-Call Scenarios, H.245 Control Signaling Conference calls- The Decomposed Gateway.

UNIT –III

The Session Initiation Protocol (SIP): SIP architecture- Overview of SIP Messaging Syntax- Examples of SIP Message sequences- Redirect Servers- Proxy Servers. The Session Description Protocol (SDP)- Usage of SDP With SIP.

UNIT -IV

Quality of Service (QoS): Need for QOS – End-to-end QoS, Overview of QOS solutions- The Resource reservation Protocol (RSVP)-Diffserv- The Diffserv Architecture- Multi-protocol Label Switching (MPLS)- The MPLS Architecture- MPLS Traffic Engineering- Label Distribution Protocols and Constraint- Based Routing.

UNIT -V

VoIP and SS7: The SS7 Protocol Suite- The Message Transfer Part (MTP), ISDN User Part (ISUP) and Signaling Connection Control Part (SCCP), SS7 Network Architecture- Signaling Points(SPs)- Single Transfer Point (STP), - Service Control Point(SCP)- Message Signal Units (MSUs)- SS7 Addressing, ISUP, Performance Requirements for SS7, Sigtran- Sigtran Architecture- SCTP- M3UA Operation- M2UA Operation- M2PA Operation- Interworking SS7 and VoIP Architectures- Interworking Soft switch and SS7- Interworking H.323 and SS7.

TEXT BOOK:

1. Daniel Collins, “Carrier Grade Voice over IP”, 2nd ed., TMH.

REFERENCE BOOKS:

1. Nicholas Wittenberg ,“Understanding Voice over IP Technology”,Cengage, 1st Ed., 2010.
2. Michael, F. Finnevan, “Voice Over WLANS – The Complete Guide”, Elsevier, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

QUEUING THEORY AND APPLICATIONS (PE-2)

UNIT - I
Review of probability, Stochastic Processes, random variables, distributions, generating functions; Poisson, Markov, renewal and semi-Markov processes, and Markov Chains, Birth-Death Process

UNIT - II
Basic Queuing Theory: An Introduction to Queues and Queuing Theory ,Characteristics of queuing systems, M/M/1 queuing system, Littles law, Reversibility and Burke's theorem, Markovian and non-Markovian queuing systems, embedded Markov chain applications to M/G/1, G/M/1 and related queuing systems;

UNIT - III
Queuing Networks: Fundamentals of Queuing Networks, Networks of queues, Open and Closed Queuing Networks, Open Networks of M/M/m type queues and Jackson's Theorem, MVA and Convolution Algorithm for Closed Networks, Approximate Models for Open and Closed Queuing Networks, Queues with vacations, priority queues, queues with modulated arrival process,

UNIT - IV
Discrete time queuing Systems: Introduction, Discrete time queuing systems, discrete time arrival process, Geome/Geom/m/N queuing system, Queuing on a Space division packet switch, Queuing on a single buffered banyan network

UNIT - V
Network traffic Modeling: Introduction, Continuous time models, discrete time Models Solution methods, Burstiness, self similar traffic

TEXT BOOKS:
1. D. Gross and C. Harris, "Fundamentals of Queuing Theory", 3rd Edition,Wiley, 1998. (WSE Edition, 2004).
2. T.G. Robertazzi, "Computer Networks and Systems - Queuing Theory and Performance Evaluation", Springer 2000.

REFERENCE BOOKS:
1. L. Kleinrock, "Queuing Systems", Vol. 1: Theory,Wiley, 1975.
2. E. Gelenbe and G. Pujolle, "Introduction to Queuing Networks", 2nd Edition, Wiley, 1998.
3. J. Medhi, "Stochastic Models in Queuing Theory", 2nd Edition,Academic Press, 2003. (Elsevier India Edition, 2006).
4. L. Kleinrock, "Queuing Systems", Volume 1: Theory, Wiley 1975.
5. R. Nelson, "Probability, Stochastic Processes, and Queuing Theory: The Mathematics of Computer Performance Modeling", Springer, 1995.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

TCP/IP INTERNETWORKING (PE-2)

UNIT - I

Network Models: Layered Tasks, The OSI Model, Layers in OSI Model, TCP/IP Protocol suite, Addressing.

Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, Backbone Networks.

UNIT - II

Internetworking Concepts: Principles of Internetworking, Connectionless Interconnection, Application Level Interconnection, Network Level Interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Routers

TCP, UDP & IP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, Process to Process Communication, User Datagram, Checksum, UDP Operation, IP Datagram, Fragmentation, Options, IP Addressing: Classful Addressing, IPV6.

UNIT - III

Congestion and Quality of Service: Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Source Based Congestion Avoidance, DEC Bit Scheme, Quality of Service, Techniques to Improve QOS: Scheduling, Traffic Shaping, Admission Control, Resource Reservation, Integrated Services and Differentiated Services.

UNIT - IV

Queue Management: Concepts of Buffer Management, Drop Tail, Drop Front, Random Drop, Passive Buffer Management Schemes, Drawbacks of PQM, Active Queue Management: Early Random Drop, RED Algorithm.

UNIT - V

Stream Control Transmission Protocol: SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control.

Mobile Network Layer: Entities and Terminology, IP Packet Delivery, Agents, Addressing, Agent Discovery, Registration, Tunneling and Encapsulating, Inefficiency in Mobile IP.

Mobile Transport Layer: Classical TCP Improvements, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission, Timeout Freezing, Selective Retransmission, Transaction Oriented TCP.

TEXT BOOKS:

1. Behrouz A Forouzan, “TCP/IP Protocol Suite”, TMH, 3rd Edition
2. B.A. Forouzan, “Data communication & Networking”, TMH, 4th Edition.

REFERENCES:

1. Mahbub Hasan & Raj Jain, ” High performance TCP/IP Networking”, PHI -2005
2. Douglas. E.Comer, “Internetworking with TCP/IP “, Volume I PHI
3. Larry L. Perterson and Bruce S. Davie , “Computer Networks- A Systems Approach”, 2011, Morgan Kaufmann
4. Jochen Schiiler, “Mobile Communications”, Pearson, 2nd Edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. TECH. I YEAR I SEMESTER
WIRELESS AND MOBILE COMMUNICATIONS

WIRELESS COMMUNICATIONS AND NETWORKS LAB

Note:

A. Minimum of 10 Experiments have to be conducted
B. All the Experiments may be Conducted using Network Simulation software like NS-2/ NSG-2.1/ WireSHARK/ SDR etc..

Note: For Experiments 1 to 7 Performance may be evaluated through simulation by using the parameters Throughput, Packet Delivery Ratio, Delay etc.

1. Evaluate the performance of various LAN Topologies
2. Evaluate the performance of Drop Tail and RED queue management schemes
3. Evaluate the performance of CBQ and FQ Scheduling Mechanisms
4. Evaluate the performance of TCP and UDP Protocols
5. Evaluate the performance of TCP, New Reno and Vegas
6. Evaluate the performance of AODV, DSR and DSDV routing protocols
7. Evaluate the performance of IEEE 802.11 and IEEE 802.15.4
8. Capturing and Analysis of TCP and IP Packets
9. Simulation and Analysis of ICMP and IGMP Packets
10. Analyze the Protocols SCTP , ARP, NetBIOS, IPX VINES
11. Analysis of HTTP ,DNS and DHCP Protocols
12. Analysis of OFDM Spectrum
13. Analysis CDMA Downlink