JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Academic Regulations For The Award Of Full Time M.Tech. P.G. Degree
(WITH EFFECT FROM THE ACADEMIC YEAR 2009-10)

The Jawaharlal Nehru Technological University Anantapur shall confer M.Tech. Post Graduate degree to candidates who are admitted to the Master of Technology Programs and fulfill all the requirements for the award of the degree.

1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the University for each programme, from time to time.

Admissions shall be made either on the basis of merit rank obtained by the qualified candidates at an Entrance Test conducted by the University or on the basis of GATE / PGECET score, subject to reservations prescribed by the University or Government policies from time to time.

2.0 COURSE WORK:

2.1 A Candidate after securing admission must pursue the M.Tech. course of study for Four semesters duration.

2.2 Each semester shall be of 20 weeks duration including all examinations.

2.3 A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

3.0 ATTENDANCE:

3.1 A candidate shall be deemed to have eligibility to write end semester examinations if he has put in at least 75% of attendance on cumulative basis of all subjects/courses in the semester.

3.2 Condonation of shortage of attendance up to 10% i.e., from 65% and above and less than 75% may be given by the college on the recommendation of the Principal.

3.3 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.

3.4 If the candidate does not satisfy the attendance requirement he is detained for want of attendance and shall reregister for that semester. He / she shall not be promoted to the next semester.

4.0. EVALUATION:

The performance of the candidate in each semester shall be evaluated subject wise, with a maximum of 100 marks for Theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

4.1 For the theory subjects 60% of the marks will be for the External End Examination. While 40% of the marks will be for Internal Evaluation, based on the better of the marks secured in the two Mid Term-Examinations held, one in the middle of the Semester (I-IV units) and another immediately after the completion of instruction (V-VIII) units with Three questions to be answered out of four in 2hours, evaluated* for 40 marks.

*****Note: All the Questions shall be of equal weightage of 10 marks and the marks obtained for 3questions shall be extrapolated to 40 marks, any fraction rounded off to the next higher mark

4.2 For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day to day performance.

4.3 For Seminar there will be an internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful. The assessment will be made by a board consisting of HOD and two internal experts at the end of IV semester instruction.

4.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

4.5 In case the candidate does not secure the minimum academic requirement in any of the subjects (as specified in 4.4.) he has to reappear for the Semester Examination either supplementary or regular in that subject, or repeat the course when next offered or do any other specified subject as may be required.

5.0 RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL EVALUATION MARKS:

Following are the conditions to avail the benefit of improvement of internal evaluation marks.

5.1 The candidate should have completed the course work and obtained examinations results for I & II semesters.

5.2 He should have passed all the subjects for which the Internal evaluation marks secured are more than 50%.

5.3 Out of the subjects the candidate has failed in the examination due to Internal evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of **three** Theory subjects for Improvement of Internal evaluation marks.

5.4 The candidate has to re-register for the chosen subjects and fulfill the academic requirements.

5.5 For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D. in favour of the

Registrar, JNTUA payable at Anantapur along with the requisition through the Principal of the respective college.

5.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

6.0 EVALUATION OF PROJECT WORK:

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ institute.

6.1 Registration of Project work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Sem)

6.2 An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor and one internal senior expert shall monitor the progress of the project work.

6.3 The work on the project shall be initiated in the penultimate semester and continued in the final semester. The duration of the project is for two semesters. The candidate can submit Project thesis with the approval of I.D.C. after 36 weeks from the date of registration at the earliest and one calendar year from the date of registration for the project work. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.

6.4 The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report.

6.5 A candidate shall be allowed to submit the thesis / dissertation only after passing in all the prescribed subjects (both theory and practical) and then take viva voce examination of the project. The viva-voce examination may be conducted once in two months for all the candidates submitted during that period.

6.6 Three copies of the Thesis / Dissertation certified in the prescribed from by the supervisor & HOD shall be presented to the H.OD. One copy is to be forwarded to the University and one copy to be sent to the examiner.

6.7 The college shall submit a panel of three experts for a maximum of 5 students at a time. However, the thesis / dissertation will be adjudicated by one examiner nominated by the University.

6.8 If the report of the examiner is favorable viva-voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the thesis / dissertation. The board shall jointly report candidates work as:

1.	Very Good	Grade A
2.	Good	Grade B
3.	Satisfactory	Grade C
4.	Not satisfactory	Grade D

If the report of the viva-voce is not satisfactory (Grade D) the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination he will not be eligible for the award of the degree unless the candidate is permitted to revise and resubmit the thesis.

7.0 AWARD OF DEGREE AND CLASS:

A candidate shall be eligible for the award of respective degree if he satisfies the minimum academic requirements in every subject and secures 'satisfactory' or higher grade report on his thesis/dissertation and viva-voce. Based on overall percentage of marks obtained, the following class is awarded.

First class with Distinction:	70% or more
First class	below 70% but not less than 60%
Second class	below 60% but not less than 50%

8.0 WITH – HOLDING OF RESULTS:

If the candidate has not paid dues to the university or if any case of in-discipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/ promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

9.0 TRANSITORY REGULATIONS:

Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course in earlier regulations and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to 4.5 and 2.3 sections. Whereas they continue to be in the academic regulations they were first admitted.

10.0 GENERAL:

i. **The academic regulations should be read as a whole for purpose of any interpretation**.
ii. **Disciplinary action for Malpractice / improper conduct in examinations is appended**.
iii. **There shall be no places transfer within the constituent colleges and affiliated colleges of Jawaharlal Nehru Technological University Anantapur.**
iv. **Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".**
v. **In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.**
vi. **The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the University.**

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RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
8.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.

M.Tech (Computer Networks) Course Structure

I YEAR I SEMESTER

Code	Subject	Hours/ Week		Credits	Evaluation(Marks)		
		L	P		Internal	External	Total
9D58203	Advanced Computer Networks	4	-	8	40	60	100
9D58101	Advanced Data Structures and Algorithms	4	-	8	40	60	100
9D58204	Distributed Systems	4	-	8	40	60	100
9D08103	Network Management Systems	4	-	8	40	60	100
9D08104	Protocol Software Engineering	4	-	8	40	60	100
9D08105a 9D08105b 9D25206a	ELECTIVE-I 1. Performance Evaluation Of Computer Networks 2. Grid Computing 3. Secure Software Engineering	4	-	8	40	60	100
9D08106	Network Programming Lab	-	4	4	40	60	100
				52	**280**	**420**	**700**

I YEAR II SEMESTER

Code	Subject	Hours/ Week		Credits	Evaluation(Marks)		
		L	P		Internal	External	Total
9D08201	Wireless Networks	4	-	8	40	60	100
9D08202	Mobile Adhoc Networks	4	-	8	40	60	100
9D08203	Peer to Peer Networks	4	-	8	40	60	100
9D08204	Optical Networks	4	-	8	40	60	100
9D08205	Cryptography and Network Security	4	-	8	40	60	100
9D08206a 9D08206b 9D58206a	ELECTIVE-II 1.Wireless Network Security 2.Trustworthy Computing 3.Software Architecture	4	-	8	40	60	100
9D08207	Wireless Networks Lab	-	4	4	40	60	100
				52	**280**	**420**	**700**

II YEAR (III & IV Semesters)

Code	SUBJECTS	CREDITS
9D08401	Seminar	10
9D08402	Project Work	36

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSIT, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D58203) ADVANCED COMPUTER NETWORKS

UNIT I Review of Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet - **Foundation of Networking Protocols:** 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM

UNIT II Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure. **The Link Layer and Local Area Networks:** Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization

UNIT III Routing and Internetworking: Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer. **Logical Addressing:** IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **Multicasting Techniques and Protocols:** Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms

UNIT IV
Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control **Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

UNIT V Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs)

UNIT VI Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

UNIT VII VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol

UNIT VIII Mobile A-Hoc Networks: Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – **Wireless Sensor Networks:** Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

TEXT BOOKS:

1. Computer Networking: A Top-Down Approach Featuring the Internet, *James F. Kurose, Keith W.Ross*, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, *Nader F. Mir*, Pearson Education, 2007

REFERENCES:

1. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, *Greg Tomsho,Ed Tittel, David Johnson,*Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking , *S.Keshav*, Pearson Education.
4. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson Education (CISCO Press)
5. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
6. The Internet and Its Protocols,A.Farrel,Elsevier.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSIT, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D58101) ADVANCED DATA STRUCTURES and ALGORITHMS

UNIT I
Overview of Data Structures: Review of Arrays, Stacks, Queues, Linked Lists, Linked Stacks and Linked Queues, Applications.

UNIT II
Algorithm Analysis: Efficiency of Algorithms, Apriori Analysis, Asymptotic Notations, Time Complexity of an Algorithm Using O Notation, Polynomial vs. Exponential Algorithms, Average, Best and Worst Case Complexities, Analyzing Recursive Programs.

UNIT III
Trees and Graphs: Introduction, Definition and Basic Terminologies of Trees and Binary Trees, Representation of Trees and Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Graphs-Basic Concepts, Representation and Traversals.

UNIT IV
Binary Search Trees, AVL Trees and B Trees: Introduction, Binary Search Trees: Definition, Operations and Applications. AVL Trees: Definition, Operations and Applications. B Trees: Definition, Operations and Applications.

UNIT V
Red-Black Trees, Splay Trees and Hash Tables: Red – Black Trees, Splay Trees and Its Applications. Hash Tables: Introduction, Hash Tables, Hash Functions and Its Applications.

UNIT VI
Divide-and-Conquer & Greedy Method: General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge Sort, Strassen's Matrix Multiplication, Greedy Method- General Method, Minimum Cost Spanning Trees, Single Source Shortest Path.

UNIT VII
Dynamic Programming: General Method, All Pairs Shortest Path, Single Source Shortest Path, 0/1 Knapsack Problem, Reliability Design, Traveling Sales Person's Problem.

UNIT VIII

Back Tracking and Branch-and- Bound: General Method, 8 – Queen's Problem, Graph Coloring. Branch-and-Bound: The Method, LC Search, Control Abstraction, Bounding, 0/1 Knapsack Problem.

TEXT BOOKS:

1. Data Structures and Algorithms Using C++, Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Second Edition, University Press.

REFERENCES:

1. Classic Data Structures, D. Samanta, 2005, PHI
2. Design and Analysis of Computer Algorithms, Aho, Hopcraft, Ullman 1998, PEA.
3. Introduction to the Design and Analysis of Algorithms, Goodman, Hedetniemi, TMG.
4. Design and Analysis of Algorithms, E. Horowitz, S. Sahani, Third Edition, Galgotia.
5. Data Structures and Algorithms in C++, Drozdek, Second Edition, Thomson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSIT, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D58204) DISTRIBUTED SYSTEMS

UNIT-I Introducton Of Distributed System: Goals, Hardware Concepts, Software Concepts, the Client-Server Model.

UNIT-II Communication: Remote Procedure Call, Remote Object Invocation, Message Oriented Communication, Stream-Oriented Communication.

UNIT-III Processes: Threads, Clients, Servers, Code Migration, Software Agents.
NAMING: Naming Entities, Locating Mobile Entities.

UNIT-IV Synchronization: Clock Synchronization, Logical Clocks, Global State, Election Algorithms, Mutual Exclusion, Distributed Transactions.

UNIT-V Consistency And Replication: Introduction, Data-Centric Consistency Models, Client Centric Consistency Models, Distribution Protocols, Consistency Protocols, Examples.

UNIT-VI Fault Tolerance: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

UNIT-VII Distributed Object-Based Systems: CORBA, Distributed COM

UNIT-VIII Distributed File Systems: SUN Network File System, The CODA File System, Other Distributed File Systems, Comparison of Distributed File Systems.

Text Books
Andrew S. Tanenbaum, Maarten Van Steen. Distributed Systems – Principles and Paradigms 2/e, PHI, 2004.

REFERENCES:

1. Pradeep K. Sinha, "Distributed Operating Systems Concepts and Design", PHI 2002.
2. Randy Chow Theodore Johnson, "Distributed Operating Systems and Algorithm Analysis", PEA, 2009.
3. George Couloris, Jean Dollimore, Tim Kind berg, "Distributed Systems Concepts and Design", 3/e, PEA, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D08103) NETWORK MANAGEMENT SYSTEMS

UNIT I

Data Communications and Network Management Overview: Analogy of Telephone Network Management, Communications Protocols And Standards, Case Histories on Network, Systems Service Management, Network Management: Goals, Organization and Functions, Network Management Architecture and Organization, Network Management Perspective, NMS Platform, Current Status and Future of Network Management.

UNIT II

Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Models, Organization Model, Information Model, Communication Model, Functional Model, Network Management Applications, Abstract Syntax Notation One: ASN.1, Encoding Structure.

UNIT III

Snmpv1 Network Management: History of SNMP Management, Internet Organizations and Standards, SNMP Model, Organization and Information Models, Communication and Functional Models.

UNIT IV

SNMP Management: SNMPV2, Major Changes In SNMPV2, SNMPV2 System Architecture, SNMPV2 Structure of Management Information, SNMPV2 Management Information Base, SNMPV2 Protocol.

UNIT V

SNMP Management: SNMPV3, SNMPV3 Key Features, SNMPV3 Documentation Architecture, SNMPV3 Applications, SNMPV3 Management Information Base, SNMPV3 User-Based Security Model, Access Control.

UNIT VI

SNMP Management: RMON, Remote Monitoring, RMON SMI and MIB, RMON1, RMON2, A Case Study on Internet Traffic.

UNIT VII

Network Management Applications: Configuration Management, Fault Management, Performance Management, Event Correlation Techniques, Security Management, Accounting Management, Report Management, Policy-Based Management, Service Level Management.

UNIT VIII

Broadband Network Management: Wired and Optical Access Networks: Broadband Access Network, Broadband Access Technology, Cable Modem Technology, Cable Access Network Management, DOCSIS Standards, ADSL2, ADSL2+, and VDSL2, Passive Optical Network, PON Management. Broadband Wireless Access Networks: Basic Principles. Advanced Management Topics: Introduction, Early Web-Based Development, CORBA- Based NM Technology, XML- Based NM Technology, Comparison Of Management Technologies, Recent NM- Related Standards.

TEXT BOOKS:

1. Network Management: Principles and Practice, Mani Subramanian, Addison-Wesley Pub Co, First Edition, 2000.
2. SNMP, SNMPV2, SNMPV3, AND RMON 1 and 2, William Stallings, Addison-Wesley, Third Edition, 1999.

REFERENCES:

1. Practical Guide to SNMPv3 and Network Management, David Zeltserman, PHI.
2. Network Security and Management, Second Edition, Brijendra Singh, PHI.
3. Network Management, Morris, Pearson Education.
4. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
5. Distributed Network Management, Paul, John Wiley.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D08104) PROTOCOL SOFTWARE ENGINEERING

UNIT I

Network Reference Model: Layered Architecture, Network Services and Interfaces, Protocol Functions, OSI Model, TCP/IP Protocol Suite, Application Protocols.

UNIT II

Formal Specification: Formal Specification in the Software Process, Sub-system Interface Specification, Behavioural Specification. Protocol Specification: Components of Protocol to be Specified, Communication Service Specification, Protocol Entity Specification, Interface Specifications, Interactions, Multimedia Protocol Specifications, Internet Protocol Specifications: Examples

UNIT III

Architectural Design: Architectural Design Decisions, System Organisation, Modular Decomposition Styles, Control Styles, Reference Architectures. Distributed Systems Architectures: Multiprocessor Architectures, Client-server Architectures, Distributed Object Architectures, Inter-organisational Distributed Computing.

UNIT IV

Formal Description Testing for Protocol Specification, Extended State Transition Language, Language for temporal Ordering Specfication, Format and Protocol Languages, Abstract Syntax Nototation: Protocols Specified in ASN, Basic Encoding Rules, Packed Encoding Rules.

UNIT V

SDL: A Protocol Specification Language: SDL, Examples of SDL Based Protocol Specifications, Other Protocol Specificaiton Languages.

UNIT VI

Protocol Verification/Validation: Protocol Verification, Verification of a Protocol Using Finite State Machines, Protocol Validation, Protocol Design Errors, Protocol Validation Approaches, SDL Based Protocol Verification, SDL Based Protocol Validation. Protocol Conformance Testing: Conformance Testing, Conformance Testing Methodology and Framework, Conformance Test Architectures, Test Sequence Generation Methods, Distributed Architecture by Local Methods, Conformance Testing with TTCN, Conformance Testing in Systems with Semicontrollable Interfaces, Conformance Testing of RIP, Multimedia Applications Testing, SDL Based Tools for Conformance Testing, SDL Based Conformance Testing of MPLS.

UNIT VII

Protocol Performance Testing: Performance Testing, SDL Based Performance Testing of TCP, SDL Based Performance Testing of OSPF, Interoperability Testing, SDL Based Interoperability Testing of CSMA/CD and CSMA/CA Protocol Using Bridge, Scalability Testing. Protocol Synthesis: Protocol Synthesis, Interactive Synthesis Algorithm, Automatic Synthesis Algorithm, Automatic Synthesis of SDL from MSC, Protocol Re-synthesis. Ptotocol Implementation: Requirements of Protocol Implementation, Object-Based Approach to Protocol Implementation, Protocol Compilers, Tool for Protocol Engineering.

UNIT VIII

Testing Models, PICS and PIX IT, Abstract Test Methods, Simulation Based Evaluation of Conformance Testing Methodologies. Examples include actual implementation like OSINET, based on ESTELLE tools and TTCU, PICS, PIX IT for OSINET.

TEXT BOOKS:

1. Communication Protocol Engineering, Pallapa Venkataram, Sunilkumar S. Manvi, PHI.
2. Protocol Specification for OSI*[1] , Gregor V. Bochmann, University of Motreal, Montreal, Quebec, Canada.
3. ASN.1: Communication Between Heterogeneous Systems, Olivier Dubuisson, Morgan Kaufmann.

REFERENCES:

1. Tools for Protocols Driven by Formal Specifications, Harry Rudin.
2. Network Protocols and Tools to help produce them*, Harry Rudin, IBM Research Division, Zurich Research Laboratory, 8803 Ruschlikon, Switzerland.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D08105a) PERFORMANCE EVALUATION of COMPUTER NETWORKS

ELECTIVE-I

UNIT I

Introduction, Design for Performance: Performance Measures-Capacity, Throughput, Loss Probability, Delay, and Queue Length. Queues in Data Communication Networks, Characterization of Data Traffic: Paretorandom Variable, Poisson Random Variable and Properties of Poisson Streams of Arrivals.

UNIT II

Simulation: Technique for Simulation, Common Mistakes in Simulation, Types of Simulations, Commonly Used Distributions: Bernoulli Distribution, Beta Distribution, Binomial Distribution, Exponential Distribution, Poisson distribution. Random Number Generators: Bernoulli Random Generation, Geometric and Modified Geometric Random Generation, Exponential and Pareto Random Generation.

UNIT III

Queuing Theory (M/M/1/∞): Introduction, Derivation of Equilibrium State Probabilities, Simple Performance Figures, Response Time and Its Distribution, Waiting Time Distribution, Analysis of Busy Times and Forward Data Link Performance and Optimization.

UNIT IV

State Dependent Markovian Queues 1: Introduction, Stochastic Processes, Markov Process, Continuous Parameter Markov Chains, Markov Chains for State Dependent Queues, Intuitive Approach for Time Averages.

UNIT V

State Dependent Markovian Queues 2: Statistical Analysis of Markov Chains Sample Functions, Little's Result – FIFO Case and Non-FIFO Case, Application Systems, Medium Access in Local Area Networks.

UNIT VI

Discrete Time Queues 1: Introduction, Timing and Synchronization, State Transitions and Their Probabilities, Discrete Parameter Markov Chains, Classification of States, Analysis of Equilibrium Markov Chains.

UNIT VII

Discrete Time Queues 2: Performance Evaluation of Discrete Time Queues, Applications of Discrete Time Queues.

UNIT VIII

Continuous Time Queuing Networks: Introduction, Model and Notation for Open Networks, Global Balance Equations, Traffic Equations, The Product Form Solution, Validity of Product Form Solution, Development of Product Form Solution for Closed Networks, Convolution Algorithm, Performance Figures from the G(N,M) Matrix, Mean Value Analysis.

TEXT BOOKS:

1. Performance Analysis of Queuing and Computer Networks, G R Dattatreya, CRC Press, 2008
2. The Art of Computer Systems Performance Analysis: Techniques for Experimental design, Measurement, Simulation, and Modeling Raj Jain, Wiley-Interscience, 1991.

REFERENCES:

1. Quantitative System Performance, E.D. Lazowska, J. Zahorjan, G.S. Graham and K.C. Sevcik, Prentice-Hall, 1984.
   (PDF Available from:Www.Cs.Washington.Edu/Homes/Lazowska/Qsp/)
2. Probability and Statistics with Reliability, Queueing and Computer Science Applications K.S. Trivedi, Prentice-Hall, 1982.
3. Queueuing Systems, Vol. 1: Theory, L. Kleinrock, Wiley 1975.
4. Queueuing Systems, Vol. 2: Applications, L. Kleinrock Wiley 1976.
5. Measurement and Tuning of Computer Systems, D. Ferrari, G. Serazzi and A. Zeign, Prentice-Hall, 1983.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D08105b) GRID COMPUTING
ELECTIVE-I

UNIT I
Introduction, Grid Computing Anatomy: Architecture, Architecture And Relationship to Other Distributed Technologies, Grid Computing Road Map.

UNIT II
Merging the Grid Services Architecture with the Web Services Architecture.

UNIT III
Open Grid Service Architecture: Introduction, Architecture and Goal, Sample Use Cases: Commercial Data Center, National Fusion Collaboratory, Online Media and Entertainment, OGSA Platform Components, Open Grid Services Infrastructure.

UNIT IV
OGSA Basic Services: Common Management Model, Service Domains, Policy Architecture, Security Architecture, Metering and Accounting, Common Distributed Logging, Distributed Data Access and Replication.

UNIT V
Globus GT 3 Toolkit: Architecture, Programming Model.

UNIT VI
A Sample Implementation, High Level Services, OGSI.NET Middleware Solutions.

UNIT VII
Anonymous Remote Computing and Communication Model: Introduction, Location-Independent Inter-Task Communication with DP, DP Model of Iterative Grid Computations, Design and Implementation of Distributed Pipes, Case Study, Performance Analysis.

UNIT VIII
Sneha-Samuham: Grid Computing Model: Introduction, Sneha-Samuham: A Parallel Computing Model over Grids, Design and Implementation of The Model, Performance Studies, Related Work.

TEXT BOOKS:

1. Grid Computing, Joshy. Joseph and Craig Fellenstein, Pearson Education, 2004.
2. Grid Computing, D.Janakiram, TMH.

REFERENCES:

1. Grid Computing: Making The Global Infrastructure A Reality, Fran Berman, Geoffrey C Fox, Anthony J G Hey, Wiley India, 2010
2. A Networking Approach to Grid Computing, D.Minoli, Wiley & Sons, 2006.
3. Grid Computing: A Practical Guide to Technology And Applications, A.Abbas, Firewall Media, 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D25206a) SECURE SOFTWARE ENGINEERING
ELECTIVE-I

UNIT I

Why Is Security A Software Issue: Introduction, The Problem, Software Assurance and Software Security, Threats to Software Security, Sources of Software Insecurity, The Benefits of Detecting Software Security Defects Early, Managing Secure Software Development.

UNIT II

What Makes Software Secure: Defining Properties of Secure Software, How to influence The Security Properties of Software, How to Assert and Specify Desired Security Properties.

UNIT III

Requirements Engineering for Secure Software: The SQUARE Process Model: Identifying Security Requirements Using The Security Quality Requirements Engineering (SQUARE) Method, SQUARE Sample Outputs, Requirements Elicitation, Requirements Prioritization.

UNIT IV

Secure Software Architecture and Design: Introduction, Software Security Practices for Architecture and Design: Architectural Risk Analysis. Software Security Knowledge for Architecture and Design: Security Principles, Security Guidelines, and Attack Patterns.

UNIT V

Considerations for Secure Coding and Testing: Introduction, Code Analysis, Coding Practices, Software Security Testing, Security Testing Considerations throughout The SDLC.

UNIT VI

Security and Complexity: System Assembly Challenges: Introduction, Security Failures, Functional and Attacker Perspectives for Security Analysis, System Complexity Drivers and Security, Deep Technical Problem Complexity.

UNIT VII

Governance and Managing for More Secure Software: Governance and Security, Adopting An Enterprise Software Security Framework, How Much Security Is Enough?, Security and Project Management, Maturity of Practice.

UNIT VIII

Security Metrics: Defining Security Metrics, Diagnosing Problems and Measuring Technical Security, Analysis Techniques, Organize, Aggregate, and Analyze Data to Bring Out Key Insights.

TEXT BOOKS:

1. Software Security Engineering: A Guide for Project Managers**,** Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary Mcgraw, Nancy R. Mead, Addison-Wesley, First Edition, 2008.
2. Security Metrics: Replacing Fear, Uncertainty and Doubt, Andrew Jaquith, Addison-Wesley, First Edition, 2007.

REFERENCES:

1. Integrating Security and Software Engineering: Advances and Future Vision, Haralambos Mouratidis, Paolo Giorgini, IGI Global, 2006.
2. The Art of Software Security Assessment: Identifying and Preventing Software Vulnerabilities, Mark Dowd, John Mcdonald, Justin Schuh, Addison-Wesley, First Edition, 2006.
3. Building Secure Software: How to avoid Security Problems the Right Way, John Viega, Gary Mcgraw, Addison-Wesley, 2001.
4. Writing Secure Code, by M. Howard, D. Leblanc, Microsoft Press, Second Edition, 2003.
5. Exploiting Software: How to Break Code, G. Hoglund, G. Mcgraw, Addison Wesley, 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) I Semester

(9D08106) NETWORK PROGRAMMING LAB

The Following Are Some Of The Suggested Experiments:

- Planning, Estimation And Implementation of A Wired Network
  (Students Should Create a Wired Network Using Desktop Systems, Network Cable, Network Elements Like Switches, Routers; Do Logical Configuration of Systems)
- Implementation JAVA RMI
- Implementation of JAVA JDBC For Password Verification and Data Retrieval
- Socket Programming In LINUX Environment
- Simulation Experiments for Creation of A Node, Links, Topologies, Traffic Generation and Performance Evaluation Using Basic Metrics Throughput, Delay, Packet Loss Etc
  (Hint: Simulators Like NS2 May Be Used For This Experiment)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08201) WIRELESS NETWORKS

UNIT I
Development of Wireless Networking, The Diversity of Wireless Networking Technologies, OSI Network Model, Physical Layer Technologies, Data Link Layer Technologies, Network Layer Technologies.

UNIT II
Wireless Network Topologies, Wireless LAN Devices, Wireless PAN Devices, RF Spectrum, Spread Spectrum Transmission.

UNIT III
Wireless Multiplexing And Multiple Access Technologies, Digital Modulation Technique, RF Signal Propagation And Reception, Ultra Wideband Radio, MIMO Radio, Infrared Communication Basics

UNIT IV
Introduction of Wireless Lans, IEEE 802.11, 802.11 Physical And MAC Layers.

UNIT V
Evaluation of Wireless LAN Requirements, Planning And Designing WLAN, Installation And Configuration, Operation And Support, Voice over WLAN Case Study, WLAN Trouble Shooting.

UNIT VI
Introduction of Wireless PAN Standards, Bluetooth, Wireless USB, Irda, Wireless PAN Technology Choices.

UNIT VII
Introduction of Wireless MAN Standards, Metropolitan Area Mesh Networks, Implementing Wireless Mans.

UNIT VIII
Introduction of Future of Wireless LAN Technology, Wireless Mesh Network Routing, Network Independent Routing, Gigabit Wlans, Cognitive Radio.

TEXT BOOKS:

1. Wireless Networking Technology: From Principles to Successful Implementation, Steve Rackley, Elsevier Publications.

REFERENCES:

1. Wireless Communicastions and Networking, vijay K. Garg, Elsevier.
2. Data Communications and Computer Networks, Prakash C. Gupta, PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08202) MOBILE ADHOC NETWORKS

UNIT I
Introduction: Applications, History of Wireless Communication, Simplified Reference Model. Wireless Transmission: Introduction, Frequencies for Radio Transmission, Signals, Modulation, Cellular Spectrums. Wireless LAN: Introduction, Infrared vs Radio Transmission, Infrastructure and Adhoc Networks, IEEE802.11, Hyper LAN, Bluetooth.

UNIT II
Medium Access Control: Introduction, Motivation for a Specialized MAC, SDMA, FDMA, TDMA, CDMA.

UNIT III
Mobile Network Layer: Introduction, Mobile IP, Dynamic Host Configuration Protocol, Adhoc Network.

UNIT IV
Mobile Transport Layer: Introduction, Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Time Out Freezing, Selective Retransmission, Transmission Oriented TCP.

UNIT V
Adhoc Networks: Fundamentals: Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio Propagation Mechanisms, Characteristics of the Wireless Channel. Adhoc Routing Protocols: Introduction, Issues in Designing A Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Ad Hoc on-Demand Distance Vector Routing (AODV), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA), Signal Stability Routing (SSR), Location-Aided Routing (LAR), Power-Aware Routing (PAR), Zone Routing Protocol (ZRP).

UNIT VI
Multicast Routing in Adhoc Networks: Introduction, Issues in Designing A Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Tree–based Multicast Routing Protocols- Bandwidth Efficient Multicast Routing Protocol, Zone Based – Core Extraction Routing Protocol, Ad Hoc on-Demand Vector

Routing Protocol, Mesh-Based Multicast Routing Protocols, On-Demand Multicast Dynamic Core Based Multicast Routing Protocol, Energy-Efficient Reliable Broadcast And Multicasting Protocols, Wireless Ad Hoc Real-Time Multicasting, Application, Dependent Multicast Routing.

UNIT VII

Transport Layer-Security Protocols: Introduction- Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Ad Hoc Transport Protocol, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Secure Routing in Ad Hoc Wireless Networks, Requirements, Security Aware Ad Hoc Routing Protocol.

UNIT VIII

QoS and Energy Management: Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Cluster TDMA, IEEE802.11e, Network Layer Solutions, QoS Routing Protocols, On-Demand QoS Routing Protocol, QoS Frameworks for Ad Hoc Wireless Networks, QoS Models, QoS Resource Reservation Signalling, INSIGNIA. Energy Management in Ad Hoc Wireless Networks: Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Energy Management Schemes, Battery Management Schemes.

TEXTBOOKS:

1. Mobile Communications, Jochen Schiller PE, Second Edition, 2004, PEA.
2. Ad Hoc Wireless Networks Architectures and Protocols, C.Siva Ram Murthy and B.S. Manoj, Prentice Hall, 2004.

REFERENCES:

1. Cellular Mobile Communication, Lee, TMH.
2. Mobile and Personal Communication Systems and Services, Pandya, 2003, PHI.
3. Ad Hoc Mobile Wireless Networks Protocols and Systems, C. K. Toh, Prentice Hall, PTR, 2001.
4. Ad Hoc Networking, Charles E.Perkins, Addison Wesley, 2000.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08203) PEER to PEER NETWORKS

UNIT I

A Network of Peers: Peer-to-Peer Models through The History of The Internet: A Revisionist History of Peer-to-Peer, The Network Model of The Internet Explosion, Observations on The Current Crop of Peer-to-Peer Applications, Peer-to-Peer Prescriptions, Listening to Napsterl**:** Resource-Centric Addressing for Unstable Environments, Follow The Users, Where's The Content?, Nothing Succeeds Like Address, OR, DNS Isn't The Only Game in Town, An Economic Rather than Legal Challenge, Peer-to-Peer Architecture and Second-Class Status.

UNIT II

Remaking the Peer-to-Peer Meme: From Business Models to Meme Maps, The Cornucopia of The Commons: Ways to Fill Shared Databases. Metadata: Data about Data, Metadata Lessons From the Web, Resources and Relationships: A Historical Overview.

UNIT III

Trust: Trust in Real Life, and its Lessons for Computer Networks, Trusting Downloaded Software, Trust in Censorship-Resistant Publishing Systems, Third-Party Trust issues in Publics, Trust in other Systems, Trust and Search Engines. Performance: A Note on Terminology, Why Performance Matters, Bandwidth Barriers, It's A Small, Small World, Case Study 1: Freenet, Case Study 2: Gnutella.

UNIT IV

Accountability: The Difficulty of Accountability, Common Methods for Dealing with Flooding and Dos Attacks, Micro Payment Schemes, Reputations, a Case Study: Accountability in Free Haven.

UNIT V

Security: Groove versus Email, Why Secure Email is a Failure, The Solution: A Groove Shared Space, Security Characteristics of a Shared Space, Mutually-Trusting Shared Spaces, Mutually-Suspicious Shared Spaces, Shared Space Formation and Trusted Authentication, Inviting People into Shared Spaces, The New-Member-Added Delta Message, Key Versioning and Key Dependencies, Central Control and Local Autonomy, Practical Security for Real-World Collaboration, Taxonomy of Groove Keys. Interoperability through Gateways**:** Why Unification?, One Network with a Thousand Faces, Well-Known Networks and their Roles, Problems Creating Gateways, Gateway Implementation.

UNIT VI

SETI@Home: Radio SETI, How SETI@Home Works, Trials and Tribulations, Human Factors, The World's Most Powerful Computer, The Peer-to-Peer Paradigm. Jabber: Conversational Technologies: Conversations and Peers, Evolving Toward The Ideal, Jabber is Created. Mixmaster Remailers**:** A Simple Example of Remailers, Onion Routing, How Type 2 Remailers Differ from Type 1 Remailers, General Discussion. Freenet: Requests, Keys.

UNIT VII

Gnutella: Gnutella in a Gnutshell, A Brief History What Makes Gnutella Different?, Gnutella's Communication System, Organizing Gnutella, Gnutella's Analogues, Gnutella's Traffic Problems, The Policy Debates, Gnutella's Effects. Publius: Why Censorship-Resistant Anonymous Publishing?, System Architecture, Cryptography Fundamentals, Publius Operations, Publius Implementation, Publius MIME Type, Publius in a Nutshell.

UNIT VIII

Red Rover**:** Architecture, Client Life Cycle, Putting Low-Tech "Weaknesses" into Perspective. Free Haven: Privacy In Data-Sharing Systems, Anonymity for Anonymous Storage, The Design of Free Haven, Attacks on Free Haven, An Analysis of Anonymity.

TEXT BOOKS:

1. Peer-to-Peer: Harnessing The Power of Disruptive Technologies, Andy Oram, O'Reilly Media, First Edition (March 15, 2001). **ISBN:** 059600110X.

REFERENCES:

1. Peer-To-Peer Computing: Technologies For Sharing and Collaborating on The Net. Intel Press, David Barkai, First Edition (March 18, 2002). **ISBN:** 0970284675.
2. Peer-To-Peer: Building Secure, Scalable, and Manageable Networks, Dana Moore, John Hebeler, Mcgraw-Hill Companies, First Edition (November 28, 2001). **ISBN:** 0072192844.
3. Discovering P2P, Sybex, Michael Miller, First Edition (November 6, 2001). **ISBN:** 0782140181.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08204) OPTICAL NETWORKS

UNIT I

Optical Fiber Principles, Optical Transmission System, Wavelength Division Multiplexing, WDM Optical Networking Evolution, WDM Point-to-Point Link, Wavelength Add/Drop Multiplexer, Wavelength Cross-Connect, Enabling Technologies For WDM Optical Networks- Architectures, Broadcast-And-Select Networks, Wavelength Routed Networks - Issues, Routing and Wavelength Assignment, Wavelength-Convertible Networks, Multi-Fiber, Wavelength Rerouting, Virtual Topology Design, Virtual Topology Reconfiguration, Survivable Networks, Multicast Routing, Network Control Management.

UNIT II

Wavelength Routing Algorithms: Classification, Route Selection Algorithms, Wavelength Selection, RWA Algorithms, Fixed Routing, Fixed Alternate - Exhaust, Least Congested Path,- Joint Wavelength, Route Selection, Fairness and Admission Control, Wavelength Reservation Method, Threshold Protection, Limited Alternate Routing, Dynamic Priority Method, Distributed Protocols, Forward Reservation, Backward Reservation, Congestion-Based Routing.

UNIT III

Wavelength- Convertible Networks: Need, Wavelength-Convertible Switch Architectures, Routing In Convertible Networks, Graph Representation of a Convertible Network, Algorithm Description, Analytical Model by Kovacevic and Acampora, Networks With Sparse Wavelength Conversion, A Model for Networks With No Conversion, Discussion on Usefulness of Converters, Converter Placement Problem, Converter Placement on a Path.

UNIT IV

Wavelength Rerouting Algorithms: Benefits of Wavelength Rerouting, Issues, Lightpath Migration, Rerouting Schemes, Algorithm AG, Algorithm MWPG, Definitions, Maintenance of Retunability Status Information, Rerouting in WDM Networks with Sparse Wavelength Conversion, Semi-Lightpath Routing, Rerouting Strategy,

UNIT V

Virtual Topology Design: Problem, Physical and Virtual Topology, Traffic Routing over Virtual Topology, Limitations on Virtual Topology, Optimization, Subproblems, Virtual Topology Problem Formulation, Definitions and Notation, Objective Functions, Constraints, Virtual Topology Design Heuristics.

UNIT VI

Network Survivability and Provisioning: Failures and Recovery, Restoration Schemes, Multiplexing Techniques, Backup Multiplexing, Primary-Backup Multiplexing, Restoration Network Design by Nagatsu Et Al., Provisioning Restorable Single-Fiber Networks, Backup Multiplexing-Based Routing, PDBWA Method.

UNIT VII

Optical Multicast Routing: Multicast Routing Problem, Node Architectures, Multicast Tree Generation, Multicast Tree Generation in a Network with Full Splitting Capability, Multicast Tree Generation in a Network With Sparse Splitting Capability, Source-Based Tree Generation, Steiner-Based Tree Generation, Virtual Source-Based Trees.

UNIT VIII

Next-Generation Optical Internet Networks: Optical Circuit Switching, IP-Over-ATM-Over-SONET-Over-WDM, IP-Over-SONET-Over-WDM, IP-Over-WDM, Overlay and Integrated Models for IP/WDM Networks, Optical Burst Switching, Optical Packet Switching, MPLS In WDM Networks.

TEXT BOOKS:

1. WDM Optical Networks: Concepts, Design and Algorithms, C. Siva Ram Murthy and Mohan Gurusamy, PHI, 2002. (Units I, II, III, and V)

REFERENCES:

1. Optical Communication Networks, B. Mukherjee, Mcgrawhill, 1997.
2. Optical Networks: A Practical Perspective, Rajiv Ramaswami and Kumar N. Sivarajan, Second Edition, Morgan Kaufmann (Elsevier Indian Edition), 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08205) CRYPTOGRAPHY and NETWORK SECURITY

UNIT I

Attacks on Computers and Computer Security: The Need for Security, Security Approaches, Principles of Security, Types of Attacks. Cryptography: Concepts and Techniques- Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks.

UNIT II

Symmetric Key Algorithms and AES**:** Algorithm Types and Modes, An Overview of Symmetric Key Cryptography, Data Encryption Standards(DES), International Data Encryption Algorithms(IDEA), RC4, RC5, Blowfish, Advanced Encryption Standards(AES).

UNIT-III

Asymmetric Key Algorithms, Digital Signatures and RSA**:** Brief History of Asymmetric Key Cryptography, An Overview of Asymmetric Key Cryptography, The RSA Algorithm, Symmetric And Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm, Some Other Algorithms.

UNIT IV

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and Macs. Hash and MAC Algorithms**:** Secure Hash Algorithm, Whirlpool, HMAC, CMAC. Authentication Protocols: Authentication Protocol, Digital Signature Standard.

UNIT V

Digital Certificates and Public Key Infrastructure: Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards (PKCS), XML PKI And Security, Creating Digital Certificates Using Java.

UNIT VI

User Authentication and Kerberos: Authentication Basics, Passwords, Authentication Tokens, Certificate-Based Authentication, Biometric Authentication, Kerberos, Key Distribution Center (KDC), Security Handshake Pitfalls, Single Sign On (SSO) Approaches.

UNIT VII

Network Security: Authentication Applications: Kerberos, X.509 Authentication Service, Electronic Mail, Security, Pretty Good Privacy (PGP), S/MIME, IP Security, Web Security.

UNIT VIII

System Level Security**:** Intrusion Detection, Password Management, Viruses and Related Threats, Virus Counter Measures, Firewall Design Principles, Trusted Systems.

TEXT BOOK:

1. Cryptography and Network Security, Atul Kahate, Tata McGraw-Hill.
2. Cryptography and Network Security: Principles and Practices, William Stallings, Prentice Hall Of India.

REFERENCES:

1. Applied Cryptography, Bruce Schneier, John Wiley & Sons Inc.
2. Security in Computing, Charles B. Pfleeger, Shari Lawrence Pfleeger, Third Edition, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08206a) WIRELESS NETWORK SECURITY
ELECTIVE-II

UNIT I
The Security of Existing Wireless Networks: Vulnerabilities of Wireless Networks, Security Requirements, How Existing Wireless Networks are Secured.

UNIT II
Upcoming Wireless Networks and New Challenges: Introduction, Upcoming Wireless Networks, Trends and Security Challenges in Wireless Networks.

UNIT III
Trust Assumptions and Adversary Models: About Trust, Trust in the Era of Ubiquitous Computing, Adversary. Naming and Addressing: The Future of Naming and Addressing in The Internet, Attacks Against Naming and Addressing, Protection Techniques. Establishment of Security Associations: Key Establishment in Sensor Networks, Exploiting Physical Contact, Exploiting Mobility.

UNIT IV
Securing Neighbor Discovery: The Wormhole Attack, Wormhole Detection Mechanisms, Secure Routing in Multi-Hop Wireless Networks: Routing Protocols for Mobile Ad Hoc Networks, Attacks on Ad Hoc Network Routing Protocols.

UNIT V
Secure Routing in Multi-Hop Wireless Networks: Securing Ad Hoc Network Routing Protocols, Provable Security for Ad Hoc Network Routing Protocols, Secure Routing in Sensor Networks.

UNIT VI
Privacy Protection: Important Privacy Related Notions and Metrics, Privacy in RFID Systems, Location Privacy in Vehicular Networks, Privacy Preserving Routing in Ad Hoc Networks.

UNIT VII
Selfish Behavior at The MAC Layer of CSMA/CA: Operating Principles of IEEE 802.11, Detecting Selfish Behavior in Hotspots, Selfish Behavior in Pure Ad Hoc Networks.

UNIT VIII

Selfishness in Packet Forwarding: Game Theoretic Model of Packet Forwarding, Meta-Model, Analytical Results, Simulation Results. Wireless Operators in a Shared Spectrum: Multi-Domain Sensor Networks, Border Games in Cellular Operators. Secure Protocols for Behavior Enforcement: System Model, Cooperation-Optimal Protocol, Protocol for the Routing Stage, Protocol for Packet Forwarding, Discussion.

TEXT BOOKS:

1. Security and Cooperation in Wireless Networks: Thwarting Malicious and Selfish Behavior in the Age of Ubiquitous Computing, Levente Buttyan and Jean-Pierre Hubaux, Cambridge University Press.

REFERENCES:

1. Cryptography and Network Security: Principles and Practices, Fourth Edition, William Stallings, Prentice-Hall India.
2. Wireless Security: Models, Threats and Solutions, Randall K. Nichols, Panos C. Lekkas, TMH.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08206b) TRUSTWORTHY COMPUTING
ELECTIVE II

UNIT I
Trustworthy Computing, Software Engineering and Computer Science: History of and Growing Need for TWC, Microsoft's TWC Initiative, The Four Pillars of TWC, Software Engineering Technologies and Tools for TWC, TWC and .NET, TWC and Java.

UNIT II
Aspect – Oriented Programming: History of AOP, AOP Basics, AOP and Related Technologies And Tools, Pitfalls of AOP, AOP for Java.

UNIT III
Principles and Applications of AOP is TWC: AOP and TWC: Cooperation Rather than Violation, AOP for Security, AOP for Error Handling, AOP for Synchronization, AOP for Trustworthy Multithreading and Multicore-Based Applications, AOP for Privacy, AOP for Reliability, AOP for Business Integrity, AOP for Design by Contract.

UNIT IV
Aspect – Oriented for .NET: AOP for .NET, Aspect.NET Principles and Architecture, Features and Use of Aspect.NET.

UNIT V
Using AOP via Aspect.NET to improve Productivity and Reliability, Application Efficiency and Performance Using AOP, AOP and Agile Programming Approaches.

UNIT VI
Fundamentals of Component and System Reliability and Review of Software Reliability: Functions of Importance in Reliability, Hazard Rate Functions In Reliability, Life Testing For Component Reliability, Redundancy In System Reliability, Redundancy In System Reliability, Review Of Software Reliability Growth Models.

UNIT VII
Software Reliability Modeling With Clustered Failure Data And Stochastic Measures to Compare Predictive Accuracy of Failure-Count Models: Software Reliability Models using The Compound Poisson Model, Stochastic Measures to Compare Failure-Count Reliability Models.

UNIT VIII

Quantitative Modeling for Security Risk Assessment: Decision Tree Model to Quantify Risk, Bayesian Applications for Prioritizing Software Maintenance, Quantitative Risk Assessment for Nondisjoint Vulnerbilities and Nondisjoint Threats, Simple Statistical Design to Estimate the Security Meter Model Input Data.

TEXT BOOKS:

1. Using Aspect Oriented Programming for Trustworthy Software Development, Safonov, V. O.John Wiley & Sons, Inc., 2007.
2. Trustworthy Computing, Sahinoglu, Wiley Interscience Publication 2008.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D58206a) SOFTWARE ARCHITECTURE
ELECTIVE-II

UNIT I

Introduction to Software Architecture: An Engineering Discipline for Software, Status of S/W Arch. Architecture Business Cycle, Where do Architectures come from. Software Processes and The Architecture Business Cycle, Features of Good Architecture.

UNIT II

Architecture Styles: Pipes and Filters, Data Abstraction and Object Oriented Organization, Even-Based Implicit Invocation, Layered Systems, Registers, Interpreters, Process Control, Other Familiar Architectures, Heterogeneous Architectures.

UNIT III

Shared Information Systems: Database Integration, Interpretation in Software Development Environments, Architectural Structures for Shared Information Systems.

UNIT IV

Architectural Design Guidance: Guidance for User Interface Architectures, Case Study in Inter Operability: World Wide Web.

UNIT V

Pattern Types: Architectural Patterns, Structural Patterns, Patterns for Distribution, Patterns for Interactive Systems.

UNIT VI

Formal Models and Specifications: Finalizing the Architectural of a Specific System, Architectural Style, Architectural Design Space, Case Study of an Industry Standard Computing. Infrastructure: CORBA

UNITVII

Architectural Description Languages: ADL's Today, Capturing Architectural Information in An ADL, Application of ADL's In System Development, Choosing an ADL, Example of ADL.

UNIT VIII

Reusing Architectural Assets within an Organization: Creating Products and Evaluating a Product Line, Organizational Implications of a Product Line, Component Based Systems. Software Architectures in Figure: Legacy Systems. Achieving Architecture, From Architecture to System.

TEXT BOOKS:

1. Software Architrecture Perspective: On an Emerging Discipline Mary Show, David Garlan, 1996, PHI.
2. Software Architecture in Practice, Len Bass, Paul Elements, Rick Kazman, 1998, PEA.

REFERENCES:

1. Measuring the Software Process: A Practical Guide to Functional Measure, Garmus, Herros, 1996, PHI.
2. Meas. Software Process: Stat. Proce. Cont. for Software Process Improvemnts, Florac, Carleton, 1999, PEA.
3. Introduction to Team Software Process, W.Humphery, 2002, PEA.
4. Software Design: Methods and Techniques, Peters, 1981, Yourdon.
5. Pattern Oriented Software Architecture, Buschmann, 1996, Wiley.
6. Design Patterns, Gamma Et Al, 1995, PEA.
7. An Introduction to Software Architecture, Gamma, Shaw, 1995, World Scientific.
8. Software Architecture, Shaw, Gamma, 1996, PHI.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, ANANTAPUR.
M.Tech (Computer Networks) II Semester

(9D08207) Wireless Networks Lab

The Following are some of the Suggested Experiments:

- Planning, Estimation and Implementation of a Wireless LAN. Should Implement Both Adhoc Mode and Infrastructure Mode of WLAN
  (Students Should Create a Wireless LAN Using Desktop Systems/Laptops with Wireless LAN Cards, Access Point; Do Logical Configuration of Systems)

- Ethical Hacking Experiments: Foot Printing, Port Scanning, Enumeration, Identifying Vulnerabilities in Microsoft Operating Systems, Identifying Vulnerabilities in LINUX Operating System

- Simulation Experiments for Creation of Nodes, Node Mobility, Traffic Generation and Performance Evaluation Using Basic Metrics Throughput, Delay, Packet Loss Etc
  (Hint: Simulators like NS2 May Be Used for This Experiment)

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