



INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY COURSE DESCRIPTION FORM

Course Title	COMPUTER NETWORKS			
Course Code	A50515			
Regulation	R15 - JNTUH			
Course Structure	Lectures	Tutorials	Practicals	Credits
	4	-	-	4
Course Coordinator	Mr.N.Bhaswanth, Assistant Professor			
Team of Instructors	Mr.N.Bhaswanth, Assistant Professor			

I. COURSE OVERVIEW:

Networks exist so that data may be sent from one place to another-the basic concept of data communications. To fully grasp this subject, we must understand the data communication components, how different types of data can be represented, and how to create a data flow. Networks are divided into two main categories: local area networks (LANs) and wide area networks (WANs). These two types of networks have different characteristics and different functionalities. The Internet, the main focus of the book, is a collection of LANs and WANs held together by internetworking devices.

II. PREREQUISITE(S):

Level	Credits	Periods/ Week	Prerequisites
UG	4	4	Bits and Bytes, Simple Mathematics

III. MARKS DISTRIBUTION:

Sessional Marks	University End Exam marks	Total marks
<p>Midterm Test</p> <p>There shall be two midterm examinations. Each midterm examination consists of essay paper, objective paper and assignment.</p> <p>The essay paper is for 10 marks of 60 minutes duration and shall contain 4 questions. The student has to answer 2 questions, each carrying 5 marks.</p> <p>The objective paper is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 fill-in-the blank questions, the student has to answer all the questions and each carries half mark.</p> <p>First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion.</p> <p>Five marks are earmarked for assignments. There shall be two assignments in every theory course. Assignments are usually issued at the time of commencement of the semester. These are of problem solving in nature with critical thinking.</p> <p>Marks shall be awarded considering the average of two midterm tests in each</p>	75	100

Sessional Marks	University End Exam marks	Total marks
course.		

IV. EVALUATION SCHEME:

S. No	Component	Duration	Marks
1.	I Mid Examination	80 minutes	20
2.	I Assignment	-	5
3.	II Mid Examination	80 minutes	20
4.	II Assignment	-	5
5.	External Examination	3 hours	75

V. COURSE OBJECTIVES:

- I. Understand** basic computer network technology
- II. Analyze** the TCP/IP model including merits and demerits.
- III. Analyze** with the various layers of OSI model including merits and demerits.
- IV. Classify** UDP and TCP models.
- V. Evaluate** the modern network architectures from a design and performance perspective

VI. COURSE OUTCOMES:

At the end of the course the students are able to:

1. **Understand** the basics of Computer Networks and various protocols.
2. **Describe** Computer Networks and the basic components of a Network system.
3. **Explain** how communication works in data networks and the Internet.
4. **Discuss** the different internetworking devices and their functions.
5. **Analyze** the features and operations of various application layer protocols

VII. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	H	Lectures
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	H	Lectures, Assignments, Exams
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	H	Problem Solving Seminars, Exercises
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	H	Lectures, Assignments, Exams
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	H	Lectures, Assignments, Workshops
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	S	--
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	N	--
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	S	--
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	H	Assessments Discussions,
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	N	--
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	S	--
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	S	--

N - None

S - Supportive

H - Highly Related

N - None

S - Supportive

H - Highly Related

VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	Professional Skills: The ability to research, understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.	H	Lectures, Assignments
PSO2	Software Engineering Practices: The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	H	Projects
PSO3	Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.	S	Guest Lectures

N - None S - Supportive H - Highly Related

IX. SYLLABUS:

UNIT-I

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration. Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

Data Link Layer-design issues, CRC Codes, Elementary Data link Layer protocols, sliding window protocol.

UNIT-II

Multiple Access Protocols- ALOHA, CSMA, Collision free protocols, Ethernet-Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT-III

Network Layer: Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Count to Infinity Problem, Hierarchical Routing, Congestion control algorithms, admission control.

UNIT-IV

Internetworking: Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses CIDR, IMCP, ARP, RARP, DHCP.

Transport Layer: Services provided to the upper layers elements of transport protocol-addressing connection establishment, connection release, Crash Recovery.

UNIT-V

The Internet Transport Protocols UDP-RPC, Real Time Transport Protocols,

The Internet Transport Protocols-Introduction to TCP, The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The Connection Management Modeling, The TCP Sliding Window, The TCP Congestion Control, The future of TCP.

Application Layer-Introduction, providing services, Application layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS,SSH.

TEXT BOOKS:

1. Data Communications and Networking-Behrouz A.Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks-Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.
3. Introduction to Computer Networks and Cyber Security, Chwan-Hwa(John)Wu, J.David Irwin, CRC Press.
4. Computer Networks, L.L.Peterson and B.S.Davie, 4th Edition, ELSEVIER.
5. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose,K.W.Ross,3rd Edition, Pearson Education.

X. COURSE PLAN:

At the end of the course, the students are able to achieve the following course learning outcomes.

Lecture No.	Topics to be covered	Course Learning Outcomes	Reference
1	Protocol, Layering Scenario	Understand the basic computer networks.	T1:2.1
2	The OSI Model	Understand the Layers of OSI Model.	T1:2.3
3	Internet history standards and administration.Comparison of the OSI and TCP/IP reference mode	Gain knowledge on previous versions of internet.	T1:2.3.1
4-6	Guided transmission media	Discuss on different wired media.	T1:7.2
7-8	wireless transmission media	Discuss on different wireless media.	T1:7.3
9	design issues, CRC Codes	Understand various error correcting techniques.	T1:10.3.1
10-16	Elementary Data link Layer protocols sliding window protocol	Learn various flow and error correction protocols.	T1:11.2
17	ALOHA, CSMA	Analyze the random access and channel access techniques.	T1:12.1.1,12.1.2
18-19	Collision free protocols	Discuss on various collision free protocols.	T1:12.1.2
20	Ethernet-Physical Layer	Describe the Ethernet.	T1:13.3.2
21	Ethernet Mac Sub layer	Describe the Ethernet Mac Sub layer.	T1:13.4.1
22	data link layer switching & use of bridges, learning bridges, spanning tree bridges	Understand the various devices for networks.	T1:17.1
23	repeaters, hubs, bridges	Understand the various devices for establishing connection in LAN.	T1:17.1.1
24	switches, routers and gateways	Understand the various devices for establishing connection in WAN.	T1:17.1.3
25	Network Layer Design issues, store and forward packet switching	Gain knowledge on Network Layer.	T1:18.1
26-27	connection less and connection oriented networks	Understand about the packet transfer between two hosts.	T1:18.2.1
28-30	routing algorithms	Analyze the shortest path between two stations.	T1:20.2
31-33	Congestion control algorithms	Organize free flow of data packets transmission.	T1:18.3.4
34	admission control	Gain quality of service for packets delivery.	T1:18.3.4.1
35	Tunneling, Internetworking	Describe how to send the data through Tunneling.	T1:22.12
36	Packet fragmentation	Analyze the size of the data packet.	T1:19.1.2
37-38	IPv4, IPv6 Protocol	Learn about various addressing schemes.	T1:18.4
39-40	IP addresses CIDR	Discuss On CIDR.	T1:18.4.3
41-42	ICMP	Learn about query and error related messages for data packets.	T1:19.2

43	ARP, RARP, DHCP	Discuss on various address related protocols	T1:18.4.4
44	Services provided to the upper layers elements of transport protocol	Discuss on Transport Layer Protocol.	T1:23.1.1
45-46	addressing connection establishment, connection release, Crash Recovery	Evaluate the recovery of crashed data packets.	T1:23.1.3
47	UDP-RPC	Understand about connection-less protocol.	T1:24.2
48	Real Time Transport Protocols	Learn about real time streaming protocol.	T1:28.4
49-50	Introduction to TCP, The TCP Service Model	Describe the TCP Protocol and its packet Format.	T1:24.3.1
51-52	The TCP Segment Header, The Connection Establishment	Define connection establishment in TCP.	T1:24.3.3
53-54	TCP Connection Release, The Connection Management Modeling	Define connection release in TCP.	T1:24.3.4
55-56	The TCP Sliding Window	Gain the knowledge on sender's & receiver's data packet size.	T1:24.3.6
57-58	The TCP Congestion Control, The future of TCP	Organize free flow of data packets transmission in TCP.	T1:24.3.9
59	Introduction, providing services, Application layer paradigms	Gain knowledge on Application Layer.	T1:25.1,25.1.2
60	Client server model, Standard client-server application	Learn about various client-server applications.	T1:25.2
61	HTTP, FTP	Discuss on FTP & HTTP protocols.	T1:26.1.2,26.2
62-63	electronic mail	Discuss on Electronic Mail.	T1:26.3
64	TELNET,SSH	Discuss on Telnet & SSH.	T1:26.4,26.5
65-67	DNS	Define name space, Domain Name Space and Explain how to assign the domain for different organization.	T1:26.6

XI. MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	H								S		S		H		H
II	H			S	H									H	H
III	H			S	H									H	S
IV	S	S			H								S	S	
V		S	S				S							S	H

S - Supportive

H - Highly Related

XII. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	H			S	S								H		S
2	S	H		S	S										S
3	S						S								S
4	S	H		S									H		
5	S	S		H								S	S	H	
S - Supportive						H - Highly Related									

Prepared by: Mr.N.Bhaswanth, Assistant Professor

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