Course Instructor Name: Mrs. Y.Prathima | Academic Year: 2024-25

Subject Name: COMPUTER NETWORKS | Section: B & D

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Sem Start Date and End Date: 8-7-24 TO 9-11-24

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HOD

1. DEPARTMENT VISION & MISSION

Vision:

To produce globally competent and industry-ready graduates in Computer Science & Engineering by imparting quality education with the know-how of cutting-edge technology and holistic personality.

Mission:

1. To offer high-quality education in Computer Science & Engineering in order to build core competence for the graduates by laying a solid foundation in Applied Mathematics and program frameworkwith a focus on concept building.
2. The department promotes excellence in teaching, research, and collaborative activities to prepare graduates for a professional career or higher studies.
3. Creating an intellectual environment for developing logical skills and problem-solving strategies, thus developing, an able and proficient computer engineer to compete in the current global scenario.

2. LIST OF PEOs, POs AND PSOs

2.1 Program Educational Objectives (PEO):

PEO 1: Excel in professional career and higher education by acquiring knowledge of mathematical computing and engineering principles.
PEO 2: To provide an intellectual environment for analyzing and designing computing systems for technical needs.
PEO 3: Exhibit professionalism to adapt current trends using lifelong learning with legal and ethical responsibilities.
PEO 4: To produce responsible graduates with effective communication skills and multidisciplinary practices to serve society and preserve the environment.

2.2. Program Outcomes (POs):

Engineering Graduates will be able to satisfy these NBA graduate attributes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **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.

3. **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.

4. **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.

5. **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.

6. **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.

7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

8. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

9. **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.

10. **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.

11. **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.

2.3 Program Specific Outcomes (PSOs):

PSO1: Professional Skills and Foundations of Software development: Ability to analyze, design and develop applications by adopting the dynamic nature of Software developments.
PSO2: Applications of Computing and Research Ability: Ability to use knowledge in cutting edge technologies in identifying research gaps and to render solutions with innovative ideas.

3. COURSE OUTCOMES

S. No	Course Out Come
CO1	**Understand** the basic concepts of computer networking, including its layered design architecture and the various types of transmission media.
CO2	**Illustrate** data link layer protocols like elementary data link protocols, sliding window protocols
CO3	**Obtain** the skills of subnetting and routing mechanisms.
CO4	**Designate** appropriate transport protocol for the intended communication service.
CO5	**Determine** the suitable protocol depending on the application's requirements.

REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing, Abridged Edition. Boston, MA: Allyn and Bacon.

Action Words for Bloom's Taxonomy					
Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	identify	manipulate	survey	grade	produce
discover	indicate	paint	advertise	measure	rearrange
duplicate	infer	prepare	appraise	predict	rewrite
enumerate	relate	produce	break down	rank	role-play
listen	restate	report	calculate	score	adapt
observe	select	teach	conclude	select	anticipate
omit	translate	act	correlate	test	arrange
read	ask	administer	criticize	argue	assemble
recite	cite	articulate	deduce	conclude	choose
record	discover	chart	devise	consider	collaborate
repeat	generalize	collect	diagram	critique	collect
retell	give examples	compute	dissect	debate	devise
visualize	group	determine	estimate	distinguish	express
	illustrate	develop	evaluate	editorialize	facilitate
	judge	employ	experiment	justify	imagine
	observe	establish	focus	persuade	infer
	order	examine	illustrate	rate	intervene
	report	explain	organize	weigh	justify
	represent	interview	outline		make
	research	judge	plan		manage
	review	list	question		negotiate
	rewrite	operate	test		originate
	show	practice			propose
	trace	predict			reorganize
	transform	record			report
		schedule			revise
		simulate			schematize
		transfer			simulate
		write			solve
					speculate
					structure
					support
					test
					validate

4. SYLLABUS COPY

UNIT – I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. **Physical Layer**: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

Data link layer: Design issues, framing, Error detection and correction

UNIT - II

.

Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT – IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK: 1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI R18 B.TECHCSE III YEAR

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav,
2. 2nd Edition, Pearson Education 2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH

5. INDIVIDUAL TIME TABLE (Dr. K. Vijay Babu)

	I	II	III	IV		V	VI	VII
MON	III-B		III B CN LAB				III-D	
TUE		III-B	III D CN LAB			III-D	III B CN LAB	
WED						III D CN LAB		
THU	III-B		III-B					
FRI		III-D				III-B		III-D
SAT				III-B			III-D	

6. SESSION PLAN/LESSON PLAN

S.NO	Topic (CMREC syllabus)	Sub-Topic	NO. OF LECTURES REQUIRED	Planned Date	Conducted Date	Suggested Books	Teaching Method
1	Network hardware, Network software	Introduction Computer Network	L1	29/7/2024	29/7/2024	T1	M1, M15
2		Basics of CN	L2	29/7/2024	29/7/2024	T1	M1,M15
3		UniT- 1 N/W Hardware	L3	30/7/2024	30/7/2024	T1	M1
4		N/W Software	L4	31/7/2024	31/7/2024	T1	M1
5		The OSI Model	L5,L6,L7	1/08/2024 2/08/2024 3/08/2024	1/08/2024 2/08/2024 3/08/2024	T1	M4, M5,M12
6		TCP/IP Reference models	L8	05/08/2024	05/08/2024	T1	M4, M5, M12
7		ARPANET, Internet.	L9	06/08/2024	06/08/2024	T1	M1
8	Physical Layer	Guided Transmission twisted pairs, coaxial cable, fiber optics,	L10,L11,L12	07/08/2024 12/08/2024 13/08/2024	07/08/2024 12/08/2024 13/08/2024	T1	M4, M12
9		Wireless Transmission	L13	19/08/2024	19/08/2024	T1	M1
10		Design Issues of Data Link Layer,	L14	20/08/2024	20/08/2024	T1	M4, M12
11		Framing	L15	21/08/2024	21/08/2024	T1	M4, M12
12		Error – Detection	L16	21/08/2024	21/08/2024	T1	M4, M12
13		Correction	L17	24/08/2024	24/08/2024	T1	M4, M12
14		Test	L18	27/08/2024	27/08/2024		UNIT-I Classes Required -16

15	DATA LINK LAYER	Unit - 2 Elementary data link protocols: simplex protocol	L19	28/08/2024	28/08/2024	T1	M1, M4
16		A simplex stop and wait protocol for an error-free channel	L20	31/08/2024	31/08/2024	T1	M1, M4, M14
17		A simplex stop and wait protocol for noisy channel	L21	3/09/2024	3/09/2024	T1	M1, M4
18		Sliding Window protocols: A one-bit sliding window protocol	L22	3/09/2024	3/09/2024	T1	M1, M4
19		A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols	L23, L24, L25	4/09/2024	4/09/2024	T1	M1, M4
20	Medium Access sub layer	Medium Access sub layer: The channel allocation problem, Multiple access protocols	L26	9/09/2024	9/09/2024	T1	M1, M4
21		ALOHA, Carrier Sense multiple access protocols	L27,L28	10/09/2024	10/09/2024	T1	M1, M4
22		collision free protocols	L29	11/09/2024	11/09/2024	T2	M1, M4
23		Wireless LANs	L30	13/09/2024	13/09/2024	T1	M1, M4
24		Data link layer switching	L31,L32	18/09/2024 21/09/2024	18/09/2024 21/09/2024	T1	M1, M4,M5
25		Test	L33	24/09/2024 25/09/2024	24/09/2024 25/09/2024	T1	UNIT-II Classes Required -14
26	Network Layer	Unit- 3 Design issues	L34	1/10/2024	1/10/2024	T1	M1, M4
27		Routing algorithms: shortest path routing, Flooding	L35, L36	1/10/2024 3/10/2024	1/10/2024 3/10/2024	T1	M3,M4, M12,M14
28		Hierarchical routing	L37	3/10/2024	3/10/2024	T1	M3,M4, M12,M14

29		Broadcast	L38	14/10/2024	14/10/2024	T1	M3,M4, M12,M14
30		Multicast	L39	15/10/2024	15/10/2024	T1	M3,M4, M12,M14
31		distance vector routing	L40	16/10/2024	16/10/2024	T1	M3,M4, M12,M14
32		Congestion Control Algorithms	L41	18/10/2024	18/10/2024	T1	M3,M4, M12,M14
33		Quality of Service	L42	19/10/2024	19/10/2024	T1	M3,M4, M12,M14
34		Internetworking	L43,L44	21/10/2024 22/10/2024	21/10/2024 22/10/2024	T1	M3,M4, M12,M14
35		The Network layer in the internet.	L45	28/10/2024	28/10/2024	T1	M3,M4, M12,M14
30		Test	L46	30/10/2024	30/10/2024		UNIT-III Classes Required -12
36	Transport Layer	Transport Services, Examples	L47	01/11/2024	01/11/2024	T1	M1,M4
37		Elements of Transport protocols	L48	01/11/2024	01/11/2024	T1	M1,M4
38		Connection management	L49	04/11/2024	04/11/2024	T1	M1,M4
39		TCPand UDP protocols.	L50, L51	04/11/2024	04/11/2024	T1	M1,M4, M5,M12
40		Test	L52	05/11/2024	05/11/2024		UNIT-IV Classes Required -6
41	Application Layer	Domain name space	L53	06/11/2024	06/11/2024	T1	M1,M4, M5,M12
42		DNS in internet	L54	11/11/2024	11/11/2024	T1	M1,M4,
43		SMTP	L55	12/11/2024	12/11/2024	T1	M1,M4,
44		Electronic mail	L56	16/11/2024	16/11/2024	T1	M1,M4, M5
45		WWW	L57,58	19/11/2024	19/11/2024	T1	M1,M4,
46		HTTP	L59	20/11/2024	20/11/2024	T1	M1,M4,
47		SNMP, Streaming Audio and video.	L60	23/11/2024	23/11/2024	T1	M1,M4, M14
48		Test	L61	25/11/2024	25/11/2024		UNIT-V Classes Required -08

METHODS OF TEACHING:

M1 : Lecture Method	**M4 : Presentation /PPT**	**M7 : Assignment**
M2 : DemoMethod	**M5 : Lab/Practical**	**M8 : Industry Visit**
M3 : Guest Lecture	**M6 : Tutorial**	**M9 : Project Based**

NOTE:

1. AnySubjectinaSemesterissupposetobecompletedin55to65periods.
2. Each Period is of 50minutes.
3. Each unit duration &completion should be mentioned in the Remarks Column.
4. ListofSuggestedbookscanbemarkedwithCodeslikeT1,T2,R1,R2etc.

7. Session Execution Log:

S no	Units	Scheduled started date	Completed date	Remarks
1	I	29-07-2024	27-08-2024	COMPLETED
2	II	28-08-2024	25-09-2024	COMPLETED
3	III	01-10-2024	03-10-2024	COMPLETED
4	IV	01-11-2024	05-11-2024	COMPLETED
5	V	06-11-2024	23-11-2024	COMPLETED

8. Lecture Notes – (hand written)

9.ASSIGNMENT QUESTIONS ALONG SAMPLE ASSIGNMENT SCRIPTS

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MID 1 ASSIGNMENT

ACADEMIC YEAR 2024-25

SUBJECT NAME: INTERNET OF THINGS

Subject: Computer Networks

Assignment -1

A.Y. 2024-25

1a. Discuss about the various transmission media available at the physical layer. **(CO1)**
1b. with a neat sketch, explain TCP/IP reference model. **(CO1)**
2a. what are the different types of error detection methods? Explain the CRC error detection technique using generator polynomial x4 +x3 +1 and data 11100011. **(CO1)**
2b. Explain about ALOHA Protocols **(CO2)**
3a. Define collision. Explain collision free protocols. Mention advantage of each protocol. **(CO2)**
3b.. Explain various noisy channel protocols. **(CO2)**
4. Explain about Wireless LAN's **(CO2)**
5a. Explain shortest path routing Algorithm **(CO3)**
5b. Discuss Design issues of Network layer. **(CO3)**

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CN Assignment –II

A.Y - 2024-2025

1. Write the concept of distance vector routing and illustrate with example. The major problem with distance vector routing algorithm is 'count to infinity'. How exchange complete path form router to destination instead of delay, helps in solving count to infinity problem. **(CO3)**

2. Explain congestion control algorithms. **(CO3)**

3 a. Discuss the transport layer service primitives. What do you understand three way handshake method Technique? And also discuss the TCP connection management **(CO4)**

b. Explain the various fields of the TCP header with the help of a neat diagram **(CO4)**

4 a. Illustrate the TCP connections, TCP releases with state transition diagram. **(CO4)**

b. Define Internetworking. Explain IPv4 Header format. **(CO4)**

5 a. Elucidate the importance of client / server architecture. What are the functions of user agent, message transfer agent and message access agent in e-mail system **(CO5)**

b.Write short notes on the following: **(CO5)**

(A)MIME (b) Audio compression (c) DNS (d) Voice over IP. (e) HTTP (f) FTP (g) WWW

Note: Submit on or before 2/12/2024 by 1.30 [pm]

10. MID EXAM QUESTION PAPER ALONG SAMPLE ANSWER SCRIPTS

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III.B.TECH-I-SEM-I MID EXAMINATIONS, **Time: 1.30 PM TO 03:30 PM**

Subject: CN **Branch: CSE** **Marks: 30 M**

Note: Question paper contains two parts, Part - A and Part - B.

Part-A is compulsory which carries 10 marks. Answer all questions in part-A.

Part-B consists of (21/2) units. Answer any one full question from each unit. Each question carries 5 marks and may have a, b, c sub questions.

Short Questions **5X2=10**

1. What is Internet? Differentiate it from intranet. **(CO1)**
2. Explain about microwaves. **(CO1)**
3. Define error detection and error correction. **(CO2)**
4. Draw the architecture of IEEE 802.11**(CO2)**
5. Differentiate between datagram packet switching and virtual circuit switching? **(CO3)**

Long Questions **4X5=20**

6. With a neat sketch, explain TCP/IP reference model. **(CO1)**
7. Discuss about the wireless transmission media at the physical layer**(CO1)**
8. Explain the flow diagram of CSMA, CSMA/CD **(CO2)**
9. Define collision. Explain collision free protocols. Mention advantage of each protocol. **(CO2)**
10. Discuss Design issues of Network layer. **(CO3)**
11. Explain shortest path routing Algorithm **(CO3)**

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III.B.TECH-I-SEM-I IIMID EXAMINATIONS, **Time: 01:30 PM TO 03:30 PM**

Subject: IOT **Branch: CSE** **Marks: 30 M**

Note: Question paper contains two parts, Part - A and Part - B.

Part-A is compulsory which carries 10 marks. Answer all questions in part-A.

Part-B consists of (21/2) units. Answer any one full question from each unit. Each question carries 5 marks and may have a, b, c sub questions.

Short Questions **5X2=10**

1. Discuss congestion control algorithms on brief. **(CO3)**
2. What is CIDR addressing? **(CO3)**
3. Draw TCP and UDP headers. **(CO4)**
4. Explain the differences between POP3 and IMAP. **(CO5)**
5. Write a short note on WWW. **(CO5)**

Long Questions **4X5=20**

6. Elucidate Distance Vector Routing Algorithm with example. **(CO3)**
7. Compare and contrast the concept in between IPv4 and IPv6. **(CO3)**
8. Explain the various fields of the TCP header with the help of a neat diagram. **(CO4)**
9. Compare and contrast the concept in between UDP and TCP. **(CO4)**
10. Describe DNS with diagrams and real-time examples. With a neat sketch **(CO5)**
11. Explain the formats of generic messages in HTTP. How security is provided for HTTP messages. **(CO5)**

12. SCHEME OF EVALUATION:

MID 1

S.NO	THEORY	MARKS	TOTAL
1	What is Internet? Differentiate it from intranet	1+1	2
2	Microwaves	2	2
3	Error detection and error correction	2	2
4	Draw the architecture of IEEE 802.11	2	2
5	Datagram packet switching and virtual circuit switching	2	2
6	TCP/IP Diagram,	2	5
	Functionalities of TCP/IP reference model	3	
7	Wireless transmission media at the physical layer	5	5
8	Flow diagram of CSMA, CSMA/CD	5	5
9	Define collision. . Explain collision free protocols	3	5
	Mention advantage of each protocol	2	
10	Design issues of network layer	5	5
11	Shortest path routing Algorithm	5	5

MID 2

S.NO	THEORY	MARKS	TOTAL
1	Congestion control algorithms	2	2
2	CIDR addressing	2	2
3	Draw TCP and UDP headers	1+1	2
4	differences between POP3 and IMAP	2	2
5	short note on WWW	2	2
6	Distance vector routing algorithm With example	5	5
7	Compare and contrast the concept in between IPv4 and IPv6.	5	5
8	various fields of the TCP header	3	5
	diagram	2	

9	Compare and contrast the concept in between UDP and TCP.	5	5
10	DNS with diagrams	3	5
	real-time examples	2	
10	the functions of user agent, message transfer agent and message access agent	3	5
	Diagrams	2	
11	Explain the formats of generic messages in HTTP.	2	5
	How security is provided for HTTP messages	3	

12.Mapping of COs and Pos with PSOs

CO/PO Mapping	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2
CO 1	3	2	-	-	-	-	-	-	-	-	-	-	-
CO 2	-	3	3	2	-	-	-	-	-	-	-	2	-
CO 3	-	3	3	2	-	-		-	-	-	-	2	-
CO 4	-	3	3	3	-	-	-	-	-	-	-	-	2
CO 5	-		3	3	3	-	-	-	-	-	2	-	3

13.Cos,POs,PSOs JUSTIFICATION

CO1: Explain the basic concepts and Models of OSI and TCP\IP and transmission media and physical layer
Correlated with PO1 moderately: The knowledge of strong basics of mathematical and engineering principles help students to demonstrate the principles of application layer protocols.
Correlated with PO2 moderately: : Analysis of application layer protocols help students to understand the existing system. Life long learning required to bring in the new developments in the upcoming applications

CO2: Apply knowledge of Computer Network Concepts to solve problems in Error Control and Access control mechanisms.
Correlated with PO2 moderately: Analysis skills required are mandatory whenever deciding the relevant protocol that should be configured for any application
Correlated with PO3 moderately: It helps students to come up with design strategies and arriving at solutions for the complex problems.
Correlated with PO4 moderately: It is an An ability to design and conduct experiments, as well as to analyze and interpret data.
Correlated with PSO1 moderately: The knowledge of strong basics of mathematical principles and computer architecture will help the students to apply and identify functionalities of different transport layer protocols.

CO3: Illustrate data link layer protocols like elementary data link protocols ,sliding window protocols.
Correlated with PO2 moderately: Analysis skills required are mandatory whenever deciding the relevant protocol that should be configured for any application and also for debugging complex problems.
Correlated with PO3 moderately: It helps students to come up with design strategies of any modifications required and induces life long learning.
Correlated with PO4 moderately: It is an An ability to design and conduct experiments, as well as to analyze and interpret data.
Correlated with PSO1 moderately: The knowledge of strong basics of mathematical principles and computer architecture will help the students to identify andapply functionalities of different network layer protocols.

CO4: Analyze the routing and congestion control mechanisms
Correlated with PO2 moderately: Applies the knowledge in identifying the appropriate end to end protocol for reliable communication. .
Correlated with PO3 moderately: Studies about the various routing techniques helps the students to fix up the shortest path routes for packets in the network
Correlated with PO4 moderately:Understanding the various end to end protocols helps in analyzing and interpreting the quality of networks.
Correlated with PSO2 moderately: Mobile networks are used in various domains and hence students will gain an . students will gain skills to function as members of multi-disciplinary teams.
CO5: Design and **implementing** user interface applications for peer to peer communication
Correlated with PO3 moderately: An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
Correlated with PO4 moderately: An ability to design and conduct experiments, as well as to analyze and interpret data.
Correlated with PO5 High: An ability to use current techniques, skills, and modern tools necessary for computing practice.
Correlated with PO11 moderately: Slightly mapped as the students can use multimedia network applications such as VoIP, you tube.
Correlated with PSO2 moderately: The knowledge of mathematical principles and basics of computer science will help the students to understand the concepts of CDNs.

Mapping POs with PEOs

		Program Outcome(PO):										
		1	2	3	4	5	6	7	8	9	10	11
	I	**X**	**X**	**X**								
	II	**X**	**X**	**X**								
	III		**X**	**X**		**X**						
PEOS	**IV**						**X**		**X**			

14.Attainment of COs,POs AND PSOs (Excel sheet)

AFTER RESULT

15. Previous Question Papers

Code No.: (R22CS501PC) | R22 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–I–Semester End Examinations (Regular) - December- 2024
COMPUTER NETWORKS
(Common for CSE, CSD)

[Time: 3 Hours] **[Max. Marks: 60]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks.

PART-A **(10 Marks)**

1. a) Define Computer Networks. [1M]
   b) Define ARPANET. [1M]
   c) Define the simplex protocol. [1M]
   d) List two advantages of collision-free protocols. [1M]
   e) What is the shortest path routing algorithm? [1M]
   f) What is congestion control? [1M]
   g) Define the transport layer. [1M]
   h) List the key elements of the TCP protocol. [1M]
   i) Define HTTP. [1M]
   j) What is SNMP used for? [1M]

PART-B **(50 Marks)**

2. Illustrate the OSI reference model with neat sketch and explain the primary functions of each layer in detail. [10M]

OR

3. Discuss various types of wireless transmission medium and its applications. [10M]

4. Describe the error detection and correction methods used in data link layer protocols. [10M]

OR

5. Explain the working of Go-Back-N and Selective Repeat ARQ protocols with examples. [10M]

6. Define Quality of Service (QoS) and explain types of services in QoS. [10M]

OR

7. Explain about the link state routing with neat diagram. [10M]

8. What are the services provided to the upper layers in the transport layer and explain briefly. [10M]

OR

9. Illustrate the TCP header format with neat sketch and describe the function of each field. [10M]

10. Describe the DNS system and its importance in the internet. [10M]

OR

11. Explain the concept of streaming audio and video and its challenges in networks. [10M]

****

Code No: 115DT **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, November/December - 2016
COMPUTER NETWORKS
(Common to CSE, IT)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) What is Frame Relay? [2]
b) Write about communication satellites. [3]
c) Define time domain reflectometry. [2]
d) Difference between Pure ALOHA and slotted ALOHA. [3]
e) Write about Jitter control. [2]
f) Write down the design issue of network layers. [3]
g) Write about Tunneling. [2]
h) What are the concepts of extension header in IPv6? [3]
i) Compare RPC and RTP. [2]
j) How does persistence timer is useful in TCP ? [3]

PART - B

(50 Marks)

2. Explain and demonstrate Selective repeat sliding window Protocol with an example. [10]

OR

3.a) Write short notes on Wireless Transmission.
b) Describe in detail about Lightwave transmission. [3+7]

4. What is the purpose of CSMA CD? And Explain it. [10]

OR

5. Explain about the following:
a) Spanning Tree Bridge
b) Remote bridge. [5+5]

6. Write briefly about Congestion control in datagram subnets. [10]

OR

7. Write an example, demonstrate how to make routing table using distance vector routing. And list down the limitation. [10]

8. How would you describe the operation of Address resolution protocol? [10]

OR

9. Explain in detail about crash recovery. [10]

10. How would you summarize the concepts of E-mail, its architecture and services? [10]

OR

11. Describe in detail about TCP segment header and connection Establishment. [10]

---oo0oo---

Code No: 115DT

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech III Year I Semester Examinations, November - 2015
COMPUTER NETWORKS
(Common to CSE, IT)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (25 Marks)

1.a)	What are the issues in data link layer?	[2]
b)	How Internet is administered?	[3]
c)	What is a switch?	[2]
d)	Explain spanning tree bridge.	[3]
e)	What is optimality principle?	[2]
f)	Explain datagram subnet.	[3]
g)	What is crash recovery?	[2]
h)	Explain packet fragmentation.	[3]
i)	What is electronic mail?	[2]
j)	What is TELNET?	[3]

PART - B (50 Marks)

2.a)	Compare OSI and TCP/IP reference model.	
b)	Discuss about Internet standards.	[5+5]
	OR	
3.a)	Describe guided transmission media.	
b)	Explain the algorithm for CRC method of error checking.	[5+5]
4.	In detail, explain the various ALOHA protocols.	[10]
	OR	
5.a)	Explain fast Ethernet and gigabit Ethernet.	
b)	Using hub, bridge, switches and router, build a network and explain the network.	[5+5]
6.	With an example, explain shortest path routing.	[10]
	OR	
7.a)	What is count-to-infinity problem? Explain.	
b)	Explain the congestion prevention policies.	[5+5]
8.	Explain the following protocols: a) RARP b) DHCP.	[5+5]
	OR	
9.a)	What are the services provided by transport layer to the upper layers?	
b)	Explain the connection establishment and release in transport layer.	[5+5]

16.Power point presentations (PPTs)

PPTs AND PRESENTATION

Uses of Computer Networks

- Business Applications
- Home Applications
- Mobile Users
- Social Issues

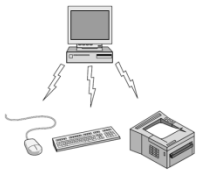
Business Applications (1)

A network with two clients and one server

Network Hardware (1)

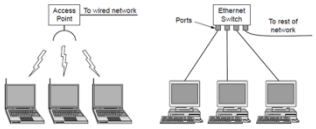
- Personal area networks
- Local area networks
- Metropolitan area networks
- Wide are networks
- The internet

Personal Area Network



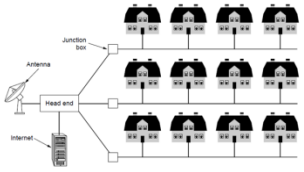
Bluetooth PAN configuration

Local Area Networks



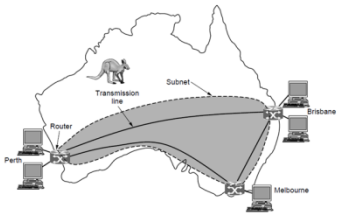
Wireless and wired LANs. (a) 802.11. (b) Switched Ethernet.

Metropolitan Area Networks



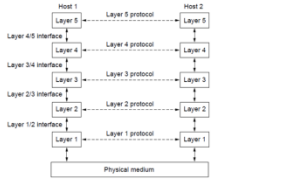
A metropolitan area network based on cable TV.

Wide Area Networks (1)



WAN that connects three branch offices in Australia

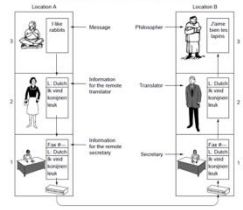
Protocol Hierarchies (1)



Layers, protocols, and interfaces.

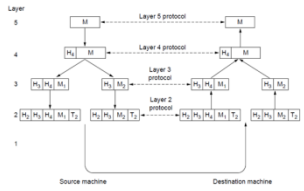
Network → / Parameter	PAN	LAN	MAN	WAN
Area Covered	Small Area (Upto 10m radius)	A few meters to a few kilometers (Upto 10Km radius)	A city and its vicinity (Upto 100Km radius)	Entire country, continent, or globe (No upper limit)
Error Rates	Lowest	Lowest	Moderate	Highest
Transmission Speed	High Speed	High Speed	Moderate Speed	Low speed
Networking Cost	Negligible	Inexpensive	moderately expensive equipment	Expensive

Protocol Hierarchies (2)



The philosopher-translator-secretary architecture

Protocol Hierarchies (3)

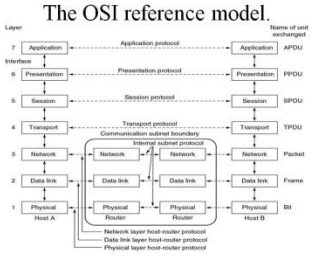


Example information flow supporting virtual communication in layer 5.

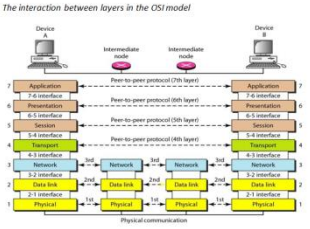
The OSI Reference Model

- In 1947, the international standards organization(ISO) is a multinational body dedicated to worldwide agreement on international standards.
- An ISO standard that covers all aspects of network communications is the **open systems interconnection** model.
- In late 1970s an open system is a set of protocols that allow any two different systems to communicate.
- It divides the communications processes into seven layers.

The OSI reference model.



The interaction between layers in the OSI model



The TCP/IP reference model

The TCP/IP reference model was developed prior to OSI model. The major design goals of this model were,

1.To connect multiple networks together so that they appear as a single network.

2.To survive after partial subnet hardware failures.

3.To provide a flexible architecture.

Transmission control protocol/ information protocol

Unlike OSI reference model, TCP/IP reference model has only 4 layers. They are,

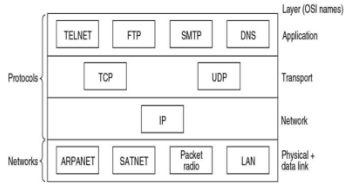
1.Host-to-Network Layer

2.Internet Layer

3.Transport Layer

4.Application Layer

- Protocols and networks in the TCP/IP model initially.

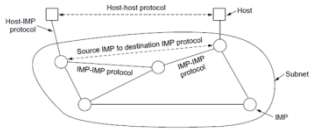


Comparing OSI and TCP/IP Models

Concepts central to the OSI model

- Services
- Interfaces
- Protocols

The ARPANET (2)



The original ARPANET design

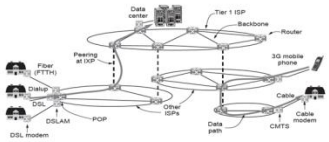
The Internet

•The Internet is not really a network at all, but a vast collection of different networks that use certain common protocols and provide certain common services.
• It is an unusual system in that it was not planned by anyone and is not controlled by anyone.
• To better understand it, let us start from the beginning and see how it has developed and why.

The ARPANET

•The story begins in the late 1950s. At the height of the Cold War, the U.S. DoD wanted a command-and-control network that could survive a nuclear war.
•At that time, all military communications used the public telephone network, which was considered vulnerable.
•Here the black dots represent telephone switching offices, each of which was connected to thousands of telephones. These switching offices were, in turn, connected to higher-level switching offices (toll offices), to form a national hierarchy with only a small amount of redundancy.
•The vulnerability of the system was that the destruction of a few key toll offices could fragment it into many isolated islands.

Architecture of the Internet



- The big picture is shown in Fig. 1-29. Let us examine this figure piece by piece, starting with a computer at home (at the edges of the figure).
- To join the Internet, the computer is connected to an Internet Service Provider, or simply ISP, from who the user purchases Internet access or connectivity.
- This lets the computer exchange packets with all of the other accessible hosts on the Internet.

Computer Networks, Fifth Edition by Andrew Tanenbaum and David Wetherall, © Pearson Education-Prentice-Hall, 2011

Twisted Pairs

- Although the bandwidth characteristics of magnetic tape are excellent, the delay characteristics are poor.
- Transmission time is measured in **minutes or hours, not milliseconds.**
- One of the **oldest** and still **most common transmission** media is **twisted pair**.
- A twisted pair consists of **two insulated copper wires**, typically about **1 mm thick**.
- The wires are twisted together in a **helical form**, just like a DNA molecule.
- Twisting is done because two parallel wires constitute a fine antenna.
- When the wires are twisted, the waves from different twists cancel out, so the wire **radiates less effectively**.
- A signal is usually carried as the **difference in voltage** between the **two wires** in the pair. This provides **better immunity to external noise.**

- To reach higher speeds, **1-Gbps** Ethernet uses all **four pairs** in both directions simultaneously.

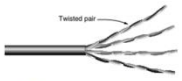


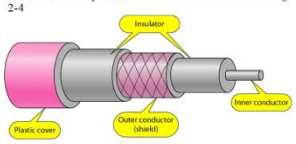
Figure 2-3. Category 5 UTP cable with four twisted pairs.

- Transmissions are 3 types
  - Duplex
  - Half Duplex
  - Simplex

Coaxial Cable

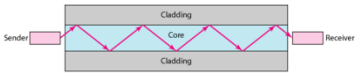
- **Another** common **transmission medium** is the **coaxial cable** (known to its many friends as just ''coax'' and pronounced ''co-ax'').
- It has **better shielding** and **greater bandwidth** than unshielded twisted pairs.
- so it can span **longer distances at higher speeds**.
- **Two kinds** of coaxial cable are widely used.
- One kind, **50-ohm cable**, is commonly used when it is intended for **digital transmission from the start**.
- The other kind, **75-ohm cable**, is commonly used for **analog transmission and cable television**.
- Starting in the mid**1990s, cable TV operators** began to provide **Internet access over cable**, which has made **75-ohm** cable more important **for data communication.**

- A coaxial cable consists of a **stiff copper** wire as the core, **surrounded** by an **insulating material.**
- The **insulator is encased** by a **cylindrical conductor**, often as a closely **woven braided mesh**.
- The outer conductor is covered in a **protective plastic sheath.** A cutaway view of a coaxial cable is shown in Fig. 2-4

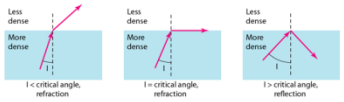


Coaxial Cable

Optical fiber



Fiber optics: *Bending of light ray*



Fiber Cables

- Fiber optic cables are **similar to coax**, except **without the braid**. Figure 2-8(a) shows a single fiber viewed from the side.
- At the **center** is the **glass core** through which the light propagates.
- In **multimode fibers,** the core is typically **50 microns** in **diameter,** about the **thickness of a human hair**.
- In **single-mode fibers**, the core is **8 to 10 microns.**

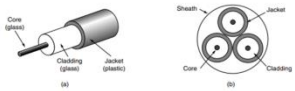
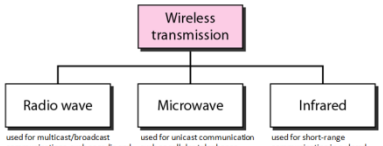


Figure 2-8. (a) Side view of a single fiber. (b) End view of a sheath with three fibers.

Wireless Transmission Waves



47

- The electromagnetic spectrum is shown in Fig. 2-10.
- The **radio, microwave, infrared, and visible light** portions of the spectrum can all be used for transmitting information by modulating the amplitude, frequency, or phase of the waves.

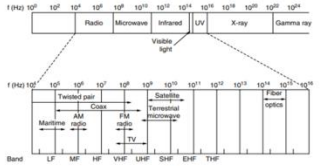
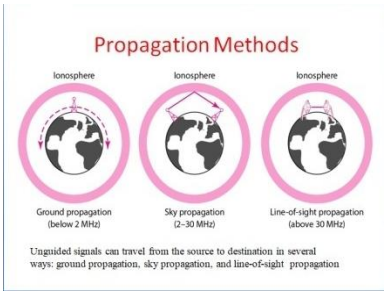


Figure 2-10. The electromagnetic spectrum and its uses for communication.

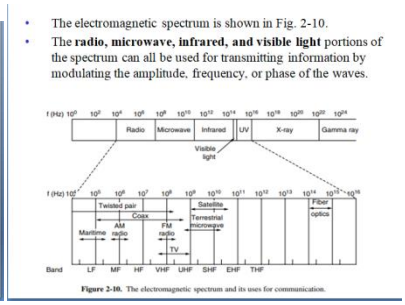
Radio Transmission

- **Radio frequency (RF)** waves are easy to generate, can **travel long distances**, and can penetrate buildings easily, so they are widely used for communication, **both indoors and outdoors.**
- Radio waves also are **omnidirectional,** meaning that they travel in **all directions** from the source, so the transmitter and **receiver do not have to be carefully aligned physically.**
- The **properties of radio waves** are frequency dependent.
- At **low frequencies**, radio waves pass through obstacles well, but the power falls off sharply with distance from the **source—at least as fast as $1/r^2$** in air—as the signal energy is spread more thinly over a larger surface.
- This attenuation is called **path loss**
- At high frequencies, radio waves tend to **travel in straight lines** and bounce off obstacles.



Light Transmission

- **Unguided optical signaling or free-space optics** has been in use for centuries.
- A more modern application is to connect the LANs in two buildings **via lasers mounted on their rooftops**.
- Optical signaling using lasers is inherently **unidirectional**, so each end needs its own **laser** and its own **photodetector.**
- This scheme offers **very high bandwidth** at very **low cost** and is relatively secure.
- Because it is difficult to tap a narrow laser beam.
- It is also relatively easy to install and, unlike microwave transmission, does not require an FCC license.
- The laser's strength, a very narrow beam, is also its **weakness here wind and temperature** changes can distort the beam and laser beams also **cannot penetrate rain or thick fog,** although they **normally work well on sunny days.**
- However, many of these factors are not an issue when the use is to connect **two spacecraft.**



- The electromagnetic spectrum is shown in Fig. 2-10.
- The **radio, microwave, infrared, and visible light** portions of the spectrum can all be used for transmitting information by modulating the amplitude, frequency, or phase of the waves.

Figure 2-10. The electromagnetic spectrum and its uses for communication.

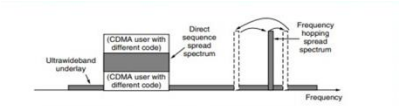


Figure 2-11. Spread spectrum and ultra-wideband (UWB) communication.

- A **third method** of communication with a wider band is **UWB (Ultra Wideband)** communication.
- UWB sends a series of rapid pulses, varying their positions to communicate information.
- The rapid transitions lead to a signal that is spread thinly over a very wide frequency band.
- UWB is defined as signals that have a bandwidth of at least **500 MHz or at least 20%** of the center frequency of their frequency band.
- It is said to **underlay** the other signals

Infrared Transmission

- **infrared waves** are widely used for **short-range communication**.
- The remote controls used for televisions, VCRs, and stereos all use infrared communication.
- They are relatively directional, cheap, and easy to build .
- But have a **major drawback**: they **do not pass through solid objects.** (Try standing between your remote control and your television and see if it still works)
- It means that an infrared system in one room of a building will not interfere with a similar system in adjacent rooms or buildings.
- **No government license** is needed to operate an infrared system.
- Infrared communication has a limited use on the **desktop, for example, to connect notebook computers and printers** with the **IrDA (Infrared Data Association)** standard, but it is **not a major player** in the communication game.

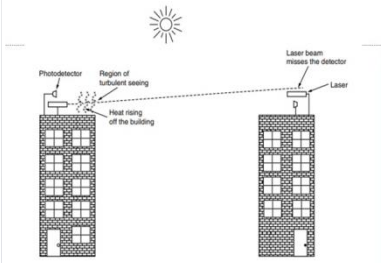


Figure 2-14. Convection currents can interfere with laser communication systems. A bidirectional system with two lasers is pictured here.

THANK YOU

17. Innovative Teaching method if any(Attached Innovative Assignment)

QUESTIONS

A.Y 2024-25

1. Give an example to explain link sate routing algorithm (CO3)

2. What is multiplexing? Explain Different types of multiplexing. (CO2)

3. What are the common Fast Ethernet implementations? Give the purpose of NIC (CO2)

18. References (Textbook/Websites/Journals)

Textbook

TEXT BOOK: 1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI R18 B.TECHCSE III YEAR

REFERENCE BOOKS:

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