CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
EET446	COMPUTER NETWORKS	PEC	2	1	0	3

Preamble: Nil

Prerequisite: Nil

Course Outcomes: After the completion of the course, the student will be able to

CO#	CO
1	Explain the computer networks, layered architecture, protocols and physical media used for setting up a network.
2	Identify the role of Data link layer, role of the MAC sub layer and networking devices in Ethernets and wireless LANs
3	Explain routing algorithms and congestion control algorithms and ways to achieve good quality of service.
4	Illustrate the IP address classes, ICMP protocols and other external routing protocols.
5	Explain the services provided by the transport layer and application layer.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2	2	1										
CO3	2	1										
CO4	2											
CO5	2											

Assessment Pattern

Bloom's Category	Continuous Assessment Tests		End Semester Examination
	1	**2**	
Remember	15	15	30
Understand	25	25	50
Apply	10	10	20
Analyse			
Evaluate			
Create			

Mark Distribution

Total Marks	CIE Marks	ESE Marks	ESE Duration
150	50	100	3

Continuous Internal Evaluation Pattern:

Attendance   : 10 marks

Continuous Assessment Test   : 25 marks

Continuous Assessment Assignment : 15 marks

End Semester Examination Pattern:

End Semester Examination Pattern: There will be two parts; Part A and Part B. Part A contain 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 14 marks.

Course Level Assessment Questions
Course outcome 1 (CO1) :
1. Compare the OSI and TCP/IP reference model (K2, PO1).
2. Distinguish between Connection oriented and connectionless service (K3, PO1).
3. Explain various performance indicators of computer networks. (K2,PO1)

Course outcome 2 (CO2) :
1. Explain the role of the Data link layer in computer networks. (K2, PO1)
2. Discuss the sliding window protocol for error detection and correction (K2, PO1, PO2).
3. Explain the use of Switches, Routers and Gateways (K2,PO1).

Course outcome 3 (CO3) :
1. What is flooding? (K1, PO1)
2. Explain various routing algorithms (Any one algorithm may be asked) (K2, PO1,PO2)
3. Discuss how congestion control is done in computer networks. (K2, PO1, PO2)
4. What is meant by Quality of service? How can it be improved? (K1, PO1)
5. Compare the performance of various routing algorithms (K3,PO1).

Course outcome 4 (CO4) :
1. Describe the format of IPv4/IPv6 datagram with the help of a diagram, highlighting the significance of each field. (any one may be asked only). (K2, PO1)
2. Explain Subnetting with an example. (K2, PO1)
3. What is the advantage of using DHCP? (K1, PO1)
4. Explain Open Shortest Path First (OSPF) Protocol and Border Gateway Protocol (BGP). (Any one may be asked as a part question) (K2,PO1)

Course outcome 5 (CO5) :

1. Explain the UDP/TCP protocol. (K2,PO1)
2. What is RPC? (K1,PO1)
3. What is the use of DNS? (K1,PO1)
4. Explain how message transfer is done using SMTP. (K2,PO1)
5. Discuss the security issues of FTP. How can it be improved? (K2,PO1)

Model Question Paper

QP CODE: PAGES: ___
Reg No:_____
Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MONTH & YEAR

Course Code: EET446

Course Name : Computer Networks

Max Marks: 100   **Duration: 3 Hours**

PART-A

(Answer All Questions. Each question carries 3 marks)

1.	What is a VPN ?	(10x3= 30 Marks)
2.	Discuss why fiber optic is preferred over copper wires, when you want to get higher bandwidth in the range of 100Mbps or higher.	
3.	What is the need for framing?	
4.	What is piggybacking ?	
5.	Compare adaptive routing algorithms with the non-adaptive type.	
6.	What is jitter and discuss how it can affect various data transfer applications.	
7.	What is the urgent need for migrating to IPv6 from IPv4?	
8.	Discuss ARP.	
9.	What is the use of DNS?	
10.	What is FTP and discuss its security concerns.	
	PART-B	
	(Answer any one Questions. Each question carries 14 marks)	
11.	"Most networks are organized as a stack of layers or levels, each one built upon the one below it". Comment on why a layered approach is adopted with reference to the OSI and TCP/IP reference models.	14
	OR	

12.	a	Distinguish between Connection-Oriented and Connectionless Service	7
	b	Explain the terms Bandwidth, Throughput, Latency, Bandwidth–Delay product.	7
13.		Suppose your organization is spread over 5 buildings in a 100 acre campus, and you are asked to set up an intranet with net connectivity. Discuss how you will set up the network highlighting the use of suitable physical media and various networking devices. A rough architecture diagram is expected.	14
OR			
14.		Explain CSMA/CD with reference to classic Ethernet LAN,	14
15.		Explain Link state routing.	14
OR			
16.		Discuss the various means by which congestion control can be achieved.	14
17.		Describe the format of IPv4 datagram with the help of a diagram, highlighting the significance of each field.	14
OR			
18.		Define Subnetting. What are the advantages of Subnetting? Explain with an example	14
19.		Compare TCP with UDP.	14
OR			
20.		Explain how message transfer is done using SMTP.	14

Syllabus

Module - 1 (Introduction and Physical Layer)

Introduction – Uses of computer networks, Network hardware, Network software - Protocol hierarchies – Design issues for the layers – Connection oriented versus connectionless service. Reference models – The OSI reference model, The TCP/IP reference model, Comparison of OSI and TCP/IP reference models.

Physical Layer –Transmission media overview – Twisted pair and fiber optics. Performance indicators – Bandwidth, Throughput, Latency, Bandwidth–Delay product.

Module - 2 (Data Link Layer)

Data link layer - Data link layer design issues, Error detection and correction, Sliding window protocols.

Medium Access Control (MAC) sublayer, Channel allocation problem, Multiple access protocols – CSMA, Collision free protocols.

Ethernet – Switched Ethernet, fast Ethernet and gigabit Ethernet.

Wireless LANs - 802.11 – Architecture and protocol stack, Use of Bridges, Repeaters, Hubs, Switches, Routers and Gateways.

Module - 3 (Network Layer)

Network layer design issues. Routing algorithms - The Optimality Principle, Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Routing for mobile hosts.

Congestion control algorithms – Approaches to congestion control (Details not required).

Quality of Service (QoS) - Requirements, Techniques for achieving good QoS – Traffic shaping, Packet scheduling.

Module - 4 (Network Layer in the Internet)

IPv4 protocol, IP addresses, IPv6, Internet Control Protocols - Internet Control Message Protocol (ICMP), Address Resolution Protocol (ARP), Dynamic Host Configuration Protocol (DHCP). Open Shortest Path First (OSPF) Protocol, Border Gateway Protocol (BGP), Internet multicasting.

Module – 5 (Transport Layer and Application Layer)

Transport service – Services provided to the upper layers, Transport service primitives. User Datagram Protocol (UDP) – Introduction, Remote procedure call.

Transmission Control Protocol (TCP) – Introduction, TCP service model, TCP protocol, TCP segment header**,** Connection establishment & release.

Application Layer –Domain Name System (DNS) – overview of DNS name space and Name servers, Electronic mail – Architecture and services- SMTP – IMAP - POP3, World Wide Web (WWW) - Architectural overview, HTTP, File Transfer Protocol (FTP).

Text Book

1. Andrew S. Tanenbaum, Computer Networks, 5/e, Pearson Education India.
2. Behrouz A Forouzan, Data Communication and Networking, 5/e, McGraw Hill Education

Reference Books

1. Larry L Peterson and Bruce S Dave, Computer Networks – A Systems Approach, 5/e, Morgan Kaufmann.
2. Fred Halsall, Computer Networking and the Internet, 5/e.
3. James F. Kurose, Keith W. Ross, Computer Networking: A Top-Down Approach, 6/e.
4. Keshav, An Engineering Approach to Computer Networks, Addison Wesley, 1998.
5. W. Richard Stevens. TCP/IP Illustrated Volume 1, Addison-Wesley, 2005.
6. William Stallings, Computer Networking with Internet Protocols, Prentice-Hall, 2004.

Course Contents and Lecture Schedule

No	Contents	No of Lecture Hrs
Module – 1 (Introduction and Physical Layer) (7 hrs)		
1.1	Introduction – Uses of computer networks	1
1.2	Uses of computer networks, Network hardware	1
1.3	Network software - Protocol hierarchies – Design issues for the layers – Connection oriented versus connectionless service.	1
1.4	Reference models – The OSI reference model, The TCP/IP reference model	1
1.5	Reference models, Comparison of OSI and TCP/IP reference models.	1
1.6	Physical Layer – Transmission media overview – Twisted pair and fiber optics.	1
1.7	Performance indicators – Bandwidth, Throughput, Latency, Bandwidth–Delay product.	1
Module 2 – (Data Link Layer) (8 hrs)		
2.1	Data link layer - Data link layer design issues	1
2.2	Error detection and correction	1
2.3	Sliding window protocols.	1
2.4	Sliding window protocols, Medium Access Control (MAC) sublayer.	1
2.5	Channel allocation problem, Multiple access protocols – CSMA	1
2.6	Collision free protocols.	1
2.7	Ethernet – Switched Ethernet, fast Ethernet and gigabit Ethernet. Wireless LANs - 802.11 – Architecture and protocol stack	1

2.8	Use of Bridges, Repeaters, Hubs, Switches, Routers and Gateways.	1
Module 3 - (Network Layer) (6 hrs)		
3.1	Network layer design issues.	1
3.2	Routing algorithms, The Optimality Principle, Shortest path routing, Flooding.	1
3.3	Distance Vector Routing.	1
3.4	Link State Routing.	1
3.5	Routing for mobile hosts, Congestion control algorithms – Approaches to congestion control (Details not required).	1
3.6	Quality of Service (QoS) - Requirements, Techniques for achieving good QoS – Traffic shaping, Packet scheduling.	1
Module 4 – (Network Layer in the Internet) (7 hrs)		
4.1	Internet Protocol (IP) - IPv4 protocol	1
4.2	IP addresses.	1
4.3	IP addresses – part 2	1
4.4	IPv6	1
4.5	Internet Control Protocols - Internet Control Message Protocol (ICMP), Address Resolution Protocol (ARP), Dynamic Host Configuration Protocol (DHCP).	1
4.6	Open Shortest Path First (OSPF) Protocol.	1
4.7	Border Gateway Protocol (BGP), Internet multicasting.	1
Module 5 - (Transport Layer and Application Layer) (7 hrs)		
5.1	Transport service – Services provided to the upper layers Transport service primitives.	1
5.2	User Datagram Protocol (UDP) – Introduction, Remote procedure call.	1
5.3	Transmission Control Protocol (TCP) – Introduction, TCP	1

	service model, TCP protocol	
5.4	TCP segment header, Connection establishment & release.	1
5.5	Application Layer –Domain Name System (DNS) – overview of DNS name space and Name servers	1
5.6	Electronic mail – Architecture and services- SMTP – IMAP - POP3	1
5.7	World Wide Web (WWW) - Architectural overview, HTTP, File Transfer Protocol (FTP).	1