

Computer Communication and Networks

Faculty Name: Archana Lopes

Course Code: EXC704

Subject Name: Computer Communication and Networks

Academic Year and Term: 2018-2019

Jul-Dec 2018

1. Syllabus

Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
EXC704	Computer Communication and Networks	04	--	--	04	--	--	04

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Ave. Of Test 1 and Test 2					
EXC704	Computer Communication and Networks	20	20	20	80	-	-	-	100

Pre requisite :

- EXC 405: Fundamentals of Communication Engineering
- EXC:504: Digital Communication

Course Objective:

1. To ensure that students have the necessary networking skills to design, implement and analyze communication networks.
2. Students will be able to design, implement, and analyze communication networks.

Course Outcome: After Completing this course student will be able to

1. Understand the fundamentals of communication and Computer networks.
2. Have the capability of designing and analyzing data transmission protocols and data link control protocols.
3. Able to discuss major trends in industry and current research activities within the discipline.
4. Able to implement networking protocols using TCP/IP based on socket programming.

Module No.	Unit No.	Topics	Hrs.
1.		Introduction to Network Architectures, Protocol Layers, and Service models	10
	1.1	Network Hardware: Topologies, LAN, MAN, WAN, Wireless network, Home Network, Internetworks, Virtual LANs	
	1.2	Network Software: Protocol Hierarchies, Design Issues for the layers, Connection oriented and connectionless Services	
	1.3	Reference Models: Layers details of OSI, TCP/IP Models, Protocol Layers and Their Service Models	
2		Physical-layer Services and Systems	08
	2.1	Introduction to physical media, Coax, fiber, twisted pair, DSL, HFC	
	2.2	Data link layer services and protocols: Link-layer and its services, Ethernet, hubs, bridges, and switches, Link- layer addressing, Error-detection and error-correction. Parity, check-summing, CRC, Manchester encoding. Aloha protocols, Control Access Protocol, Carrier Sense	
	2.3	Multiple Access (CSMA), Local Area Networks - Ethernet, Token ring, FDDI. WiMax, cellular, satellite, and telephone networks, Bit transmission, Frequency division multiplexing. Time division multiplexing	
3		Data Link Layer Protocol	10
	3.1	PPP, HDLC, Stop and wait protocol	
4		Network Layer Services and Protocols	10
	4.1	Switching fabric, Routing and forwarding, Queues and buffering, Virtual-circuit and datagram networks, Internet protocol	
	4.2	IPv4 and IPv6, Tunneling, LS and DV algorithms. Routing in the Internet, RIP, OSPF, and BGP	
	4.3	Broadcast and multicast, Handling mobility	
5		Reliable and Unreliable Transport-layer Protocols	08
	5.1	GBN and SR. TCP and UDP. Port numbers, Multiplexing and de-multiplexing	
	5.2	Flow control and congestion control. Fairness, Delay, jitter, and loss in packet-switched networks	
	5.3	Bandwidth, throughput, and quality-of-service	
6		Principles of Network Applications.	06
	6.1	Application layer protocols such as HTTP, FTP, and SMTP,	
	6.2	Peer-to-Peer File Sharing Protocols and Architectures, ISPs and Domain name systems, Socket API and network socket programming	
Total			52

2.Course Outcomes

Course Objective:

- To ensure that students have the necessary networking skills to design, implement and analyze communication networks.
- Students will be able to design, implement, and analyze communication networks.

Course Outcomes:

At the end of the course student will be able to

EXC704.1: Understand the fundamentals of communication and Computer networks.

EXC704.2: Implement flow control techniques using modern simulation tools.

EXC704.3: Analyze the different protocols used at the Network and Transport Layer

EXC704.4: Implement Application layer protocols .

EXC704.4: Implement TCP/IP based networking protocol using socket programming.

Mapping of CO with PO/PSO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
EXC704 .1	3													
EXC704 .2		3		1	2									2
EXC704 .3		3		2										2
EXC704 .4					3								1	
EXC704 .5					3									

Mapping of CO with PO with Justification

CO	PO	Justification
CO1	PO1	Understand the need for ISO standards and the network architecture models.
CO2	PO2	Identify the error control technique for specific application.
	PO4	Use test results and analyze the data to determine the valid flow control technique.
CO3	PO2	Identify the need of a particular protocol at the Network and the Transport Layer by analyzing the practical problem.
	PO4	Use test based knowledge and design experiment to differentiate between protocols used for solving the problem.
CO4	PO5	Use Linux tools to implement application layer protocols like ftp,http etc.
CO5	PO5	Use C/C++/Java to implement TCP/IP protocol based on socket programming.

Mapping of CO with PSO with Justification

CO	PSO	Justification
EXC704.2	PSO2	Test flow control techniques for different situations.
EXC704.3	PSO2	Test the working of different transport and network layer protocols .
EXC704.4	PSO1	Provide solution for different computer applications by implementing application layer protocol.

Contribution to outcomes will be achieved through content delivery:

Modes of Content Delivery:

i	Class Room Teaching	v	Self Learning Online Resources	ix	Industry Visit
ii	Tutorial	vi	Slides	x	Group Discussion
iii	Remedial Coaching	vii	Simulations/Demonstrations	xi	Seminar
iv	Lab Experiment	viii	Expert Lecture	xii	Case Study

Modes of delivery

Modes of Delivery	Brief description of content delivered	Attained COs	Attained POs
Class room lecture	<ul style="list-style-type: none"> Introduction to Network Architectures, Protocol Layers, and Service models Physical-layer Services and Systems Data Link Layer Protocol Network Layer Services and Protocols Reliable and Unreliable Transport-layer Protocols Principles of Network Applications. 	CO1 CO2 CO3 CO4 CO5	PO1 PO2 PO4 PO5
Assignments	<ul style="list-style-type: none"> Assignment 1 based on Network Architectures and Physical layer services. Assignment 2 based on Data Link Layer Protocol and Network Layer Services Assignment 3 based on the Transport Layer Protocols 	CO1 CO2 CO3	PO1 PO2 PO4
Lab Assignments	Application Layer Protocols Networking Protocol	CO4 CO5	PO5

CO Assessment Tool

Course Outcome	Assessment Method							
	Direct Method (70 %)						Indirect Method (30%)	
	Unit Tests		Assignments			Laboratory Practical	End Sem. Exam	Course exit survey
	1	2	1	2	3			
EXC704.1	30%		20%				50%	100%
EXC704.2	20%	10%		10%		10%	50%	100%

THEORY LESSON PLAN – CCN (EXC 704)

EXC704.3	10%	30%			10%		50%	100%
EXC704.4						50%	50%	100%
EXC704.5						50%	50%	100%

Rubrics for assessing Course Outcome CO1, CO2 and CO3 with each assessment tool:

Rubrics				
Assignment	Timeline (2)	Level of Content(4)	Reading and Understanding(4)	
Laboratory Experiments	Timeline(3)	Knowledge (4)	Skill(3)	

3. Lesson Plan

Faculty : Archana Lopes

Class & Division		B.E. (Electronics Engineering) – Semester VII	
Academic Term		July 2018 – October 2018	
Subject		Computer Communication & Networks (CCN)	
Faculty I/C		Archana Lopes	
Periods (Hours) per week	Lectures	04 Hours / Week	
	Practicals	02 Hours / Week	
	Tutorials	--	
Evaluation System		Hours	Marks
	Theory examination	3	80
	Internal Assessment	--	20
	Practical Examination	--	--
	Oral Examination	--	25
	Term work	--	25
	Total	--	150
Time Table	Days	Timings	
	Tuesday	11:00 am to 12 noon	
	Thursday	12 noon to 01:00 pm	

COURSE CONTENTS & LESSON PLAN

Week No.	Lecture No.	Dates		Topics Planned to be Covered	Course Outcome (CO)	Programme Outcome (PO)	Assignments	Teaching Aids	Remarks
		Scheduled	Conducted						
1	1	04/07/2018	04/07/2018	Introduction to the course / subject – CCN (EXC 704) with course objectives, course outcomes (CO) & the mapping with programme outcomes (PO) & academic administration					NBA
1	2	05/07/2018	05/07/2018	Introduction to network hardware – topologies including bus, ring, star, mesh & tree (hybrid) along with their description, advantages & disadvantages.	EXC 704.1	PO-1		PPT	
1	3	06/07/2018	12/07/2018	Network software protocol hierarchies, design Issues for the layers, connection oriented & connectionless services & the N-layered architecture model – features & advantages	EXC 704.1	PO-1		PPT	
2	4	11/07/2018	13/07/2018	The ISO – OSI (open system interconnect) reference model with description, advantages & disadvantages; different layers of OSI model & their layer services	EXC 704.1	PO-1			
2	5	12/07/2018	17/07/2018	The TCP / IP protocol – description of different layers with their services & comparison with OSI reference model, advantages of TCP / IP over OSI model					

2	6	13/07/2018	19/07/2018	The TCP / IP protocol – description of different layers with their services & comparison with OSI reference model, advantages of TCP / IP over OSI model					
3	7	17/07/2018	24/07/2018	Introduction to physical transmission medium – wired (twisted pair cable, co-axial cable & fiber optic cable) & wireless (radio waves, microwaves & infrared)					
3	8	19/07/2018	25/07/2018	Local Area Networks-Ethernet ALOHA protocol, control access protocol (CAS), carrier sense multiple access (CSMA) & local area networks – Ethernet, Token Ring & FDDI					
3	9	24/07/2018	25/07/2018	WiMax, cellular, satellite, and telephone networks					
3	10	27/07/2018	26/07/2018	Frequency division multiplexing (FDM) & Time division multiplexing (TDM) – features, characteristics, merits, demerits & comparison of TDM & FDM					
4	11	31/07/2018	31/07/2018	Network connecting devices – hubs, repeaters, bridge, routers, gateways & switches – description of function & comparison of each device with each other			Assignment No.1		
4	12	02/08/2018	02/08/2018	Network layer services & protocols – Switching fabric, Routing & forwarding, Queues & buffering, network layer design issues					
4	13	07/08/2018	03/08/2018	Virtual-circuit and datagram networks					
4	14	10/08/2018	07/08/2018	Virtual-circuit and datagram networks					
5	15	21/08/2018	21/08/2018	Internet protocol : IPv4 and IPv6	EXC 704.3	PO-2			

5	16	23/08/2018	27/08/2018	Internet protocol : IPv4 and IPv6	EXC 704.3	PO-4			
5	17	28/08/2018	28/08/2018	Tunnelling, LS and DV algorithms.					
5	18	30/08/2018	30/08/2018	LS and DV algorithms.			Assignment No. 2		
6	19	04/09/2018	04/09/2018	Routing in the Internet, RIP, OSPF, and BGP Broadcast and multicast, Handling mobility					
6	20	06/09/2018	11/09/2018	Routing in the Internet, RIP, OSPF, and BGP Broadcast and multicast, Handling mobility					
6	21	11/09/2018	21/09/2018	HTTP,FTP,SMTP	EXC 704.4	PO-5			
6	22	18/09/2018	25/09/2018	Peer-to-Peer File Sharing Protocols and Architectures, ISPs and domain name systems	EXC 704.4	PO-5			
8	23	22/08/2018	27/09/2018	Socket API and network socket programming	EXC 704.4	PO-5			
13	24	25/09/2018	03/10/2018	Socket API and network socket programming					

List of Reference & Text Books :-

1. Behrouz A. Fourouzan – Data Communications & Networking, Tata McGraw Hill, 4th edition
2. S. Tanenbaum – Computer Networks, Pearson Education, 4th edition
3. J. F. Kurose & K. W. Ross – Computer Networking ‘A Top Down Approach’, Addison Wesley, 5th edition

Internal Assessment (IA) :-

Two tests must be conducted which should cover at least 80% of syllabus. The average marks of both the tests will be considered as final IA marks.

End Semester Examination :-

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. Total 4 questions need to be solved.
3. Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 5 marks will be asked.
4. Remaining questions will be selected from all the modules.