Computer Networks

Course Code	21CS52	Course type	IPCC	Credits L-T-P	3 - 0 - 1
Hours/week: L - T- P	3 - 0 - 2			Total credits	4
Total Contact Hours	L = 40 Hrs; T = 0 Hrs; P = 20 Hrs Total = 60 Hrs			CIE Marks	100
Flipped Classes content	10 Hours			SEE Marks	100

Course learning objectives	
1.	Elucidate basic computer networking.
2.	Demonstration of application layer protocols.
3.	Discuss transport layer services and understand UDP and TCP protocols.
4.	Explain routers, IP and Routing Algorithms in network layer.
5	Demonstrate the error detection and correction at link layer.

Required Knowledge of : Fundamentals of basic mathematics, Data Structures and algorithms, Computer Organization, Operating systems.

Unit – I	Contact Hours = 8 Hours
Introduction to Computer Networks and the Internet: The Internet, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models	

Unit – II	Contact Hours = 8 Hours
Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP Commands and Replies, Electronic Mail in the Internet, The Internet's Directory Service, Peer-to-Peer Applications-Bit Torrent File distribution protocol.	

Unit – III	Contact Hours = 8 Hours
Transport Layer: Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer: Go Back-N and Selective Repeat, Connection-Oriented Transport: TCP.	

Unit – IV	Contact Hours = 8 Hours
The Network layer: Introduction, Virtual Circuit and Datagram Networks, Inside a Router, The Internet Protocol (IP): Forwarding and Addressing in the Internet.	

Unit – V	Contact Hours = 8 Hours
The Link Layer: Links, Access Networks, and LANs: Introduction to the Link Layer, Error Detection and Correction Techniques, Multiple Access Links and Protocols, Introduction to Link Virtualization and Data Center Networking.	

Flipped Classroom Details

Unit No.	I	II	III	IV	V
No. for Flipped Classroom Sessions	2	2	2	2	2

List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	**1**	Introduction to computer networks and physical media
2	**1**	Application Network Security
3	**2**	UDP-Connection less Transport
		TCP-Connection Oriented Transport
4	**2**	Distance vector routing algorithm
		Congestion control Algorithm
5	**1**	Implement any Error detection technique.

Unit No.	Self-Study Topics
1	Network Attacks and Network Security Threats
3	Socket Programming
4	Inter-Autonomous System Routing

Books	
	Text Books:
1.	James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017 .
2.	Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER
	Reference Books:
1.	Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition
2.	Andew S Tanenbaum and David Wetherall, Computer Networks, Fifth Edition Pearson
	E-resources (NPTEL/SWAYAM.. Any Other)- mention links
1.	https://nptel.ac.in/courses/106105081/ https://onlinecourses.swayam2.ac.in/cec19_cs07/

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Virtual Labs (if present)		

Course Outcome (COs) **Learning Levels:** **Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr - Create**				
At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	Explain the structure and different components of Internet.	Un	1,2	1
2.	Explain the principles of application layer protocols.	Un	1	1
3.	Recognize the transport layer services and infer the different protocols.	Ap	1,5	1,2
4.	Differentiate between the different types of Services and the application of routing algorithms	An	1,2,12	1,3
5.	Perform error detection and correction at link layer.	Ap	1,2	1

Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab**.

THEORY (60 marks)			**LAB (40 marks)**		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks

IA Test:

1. No objective part in IA question paper
2. All questions descriptive

Conduct of Lab:

1. Conducting the experiment and journal: 5 marks
2. Calculations, results, graph, conclusion and Outcome: 5 marks
3. Viva voce: 5 marks

Lab test: (Batchwise with 15 students/batch)

1. Test will be conducted at the end of the semester
2. Timetable, Batch details and examiners will be declared by Exam section
3. Conducting the experiment and writing report: 5 marks
4. Calculations, results, graph and conclusion: 10 marks
5. Viva voce: 10 marks

Eligibility for SEE:

1. 40% and above (24 marks and above) in theory component
2. 40% and above (16 marks and above) in lab component
3. **Lab test is COMPULSORY**
4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2.	**Minimum marks required in SEE to pass: 40 out of 100**

3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
1	✓	✓											✓		
2	✓												✓		
3	✓				✓								✓	✓	
4	✓	✓										✓	✓		✓
5	✓	✓											✓		
Tick mark the CO, PO and PSO mapping															

Sl No	Skill & competence enhanced after undergoing the course	Applicable Industry Sectors & domains	Job roles students can take up after undergoing the course
1	Analytical Skills	Software Engineer	Network administrator
2	Programming skills	Software Developer	Network architect