Course Handout

Institute/ School Name	Chitkara School of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Program Name	Bachelor of Engineering (B.E.) Computer Science & Engineering		
Course Code	CS117	Course Name	Computer Networks
L-T-P (Per Week)	3-0-2	Course Credits	04
Academic Year	2023-24	Semester/Batch	3rd/2022
Course Coordinator	Dr. Ramamani Tripathy		

1. Course Outline:

Introduction, mode of data communication, network devices, seven-layer OSI model, TCP/IP layer, guided and unguided media, switching techniques, mac layer, framing, stop-wait protocol, sliding window, go-back ARQ, IP address, congestion control techniques, routing protocols, QoS, HTTP, SNMP, FTP, SMTP, VPN, SSH, TELNET.

2. Programme Outcomes (POs):

At the end of the programme, students will be able to:	
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 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.
PO 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.
PO 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.
PO 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.
PO 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.
PO 7	**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.
PO 8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
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.
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.
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.

3. Course Learning Outcomes (CLO):

Student should be able to

CLO1: Describe and analyze the hardware, software, components of a network and the interrelations.
CLO2: Explain networking protocols and their hierarchical relationship hardware and software.
CLO3: Compare protocol models and select appropriate protocols for a particular design.
CLO4: Manage multiple operating systems, systems software, network services and security.
CLO5: Explain concepts and theories of networking and apply them to various situations, classifying networks, analyzing performance and implementing new technologies.
CLO6: Imparting skills to analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.

4. CLO-PO Mapping Matrix:

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1		H	H									
CLO2		M							L		H	
CLO3		H	M								M	
CLO4					H				L			
CLO5	M	H	M		M						M	
CLO6					M			H			L	

5. ERISE Grid Mapping:

Feature Enablement	Level (1-5, 5 being highest)
Entrepreneurship	1
Research/Innovation	2
Skills	5
Employability	4

Recommended Books (Reference Books/Text Books) :

B01: Forouzan, B. A., & Fegan, S. C. (2007). Data Communication and Networking. McGraw-Hill Companies. Inc. New York.

B02: Tanenbaum, A. S. (2003). Computer networks. Pearson Education India.

B03: Peterson, L. L., & Davie, B. S. (2007). Computer networks: a systems approach. Elsevier.

B04: Comer, D. (2015). Computer networks and internets. Cambridge, MA, USA:: Pearson.

6. Other readings and relevant websites:

Serial No.	Link of Journals, Magazines, Websites and Research Papers
R1	https://infyspringboard.onwingspan.com
R2	https://onlinecourses.swayam2.ac.in/cec21_cs21/preview
R3	https://www.udemy.com/course/certified-network-principles-cnp/
R4	https://onlinecourses.nptel.ac.in/

R5	https://in.coursera.org/learn/computer-networking
	Link of Audio-Video resources
V1	https://www.youtube.com/watch?v=PYFqhGDejM4
V2	https://nptel.ac.in/courses/106105183
V3	https://www.youtube.com/watch?v=q1OF_0ICt9A

* Resources uploaded on ERP system is accessible to all the students registered for the course.

7. Recommended Tools and Platforms:

Cisco Packet Tracer

8. Course Plan:

Lecture Number	Topics	Weightage in ETE (%)	Instructional Resources
1-4	Introduction to Computer Network: Uses of Computer Networks: Business Applications, Home Applications, Mobile Users, Social Issues, Network Hardware: LANs, MANs, WANs.Mode of Data transmission, Network devices: Hub, Switches, Bridge, Router, Repeater, Modem, Gateway,	30%	B01, R1, V1
5-6	Practice Problems: • Introduction to Packet Tracer and installation • IP addressing, basic commands etc. • Sharing of network resources.		
7-11	Physical Layer: The OSI Reference Model, The TCP/IP Reference Model. Example, physical topology, Networks: The Internet, Connection-Oriented Networks (X.25, Frame Relay & ATM), Ethernet, Switching Techniques: circuit switching, Packet switching, Message Switching		B01, B02, R1, V2
12-13	Practice Problems: • Identification of network cables		
14-20	Link layer: Framing, Error Detection and Correction, Flow control (Elementary Data Link Protocols, Sliding Window protocols). Medium Access Control and Local Area Networks: Channel allocation, Multiple access protocols, LAN standards, Link layer switches & bridges (learning bridge and spanning tree algorithms).	35%	B02, R4
21-22	Network connectivity		
23-24	Simulation of Network Devices (HUB, Switches, Router) and connect more than two computers using Switch –Star Topology.		
25-33	Network Layer: Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP), Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms, IPv6.		B02, R3, V2
34-35	Basic commands of Routers: hostname, password, Show Run, Show IP int brief, Assigning IP addresses to interfaces.	35%	
36-37	To Perform Static Routing		
38-39	To Perform Dynamic Routing using RIP (RIP-V1 and RIP-V2)		
40-41	To Perform Dynamic Routing using EIGRP		
42-50	Transport Layer: Process-to-process delivery, Transport layer protocols (UDP and TCP), Multiplexing, Connection management, Internet Transport Protocols (TCP): Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP		B03, BO2, R3, V1

	Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management, Wireless TCP & UDP Transactional TCP.		
51-52	To Perform Dynamic Routing using OSPF with Single area concept		
53-54	To Perform Dynamic Routing using OSPF with Multiple area concept		
55-60	Session Layer: Services, Features. Protocols, Presentation layer protocols, Application layer protocols: HTTP, SNMP, FTP, VPN, TELNET, SSH, DNS, electronic mail		BO4, BO1, V3

9. Industry Interventions:

- Expert Session on the topics Routing, IP addressing
- Industry Curated Module:
  TOC - Design and Simulate Smart Home Networks in Packet Tracer | Infosys Springboard (onwingspan.com)

10. Action plan for different types of learners

Slow Learners	Average Learners	Advanced Learners
Remedial Classes	Practice Assignment	Interclass Competition

11. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Internal Component 1	Formative Assessments (FAs)	02*	20%	Viva / Written Test
Internal Component 2	Sessional Tests (STs)	03**	30%	Offline Platform
External Component	End Term Examination (ETEs)	01	50%	Offline Platform
Total		**100%**		

* Out of 02 FAs, the ERP system automatically picks the best 01 FA marks for calculation of final marks.
** Out of 03 STs, the ERP system automatically picks the best 02 ST marks for evaluation of final marks.

12. Details of Evaluation Components:

Evaluation Component	Description	Syllabus Covered (%)	Timeline of Examination	Weightage (%)
Internal Component 1	FA1	Up to 25%	Week 4	20%
	FA2	26%-50%	Week 9	
Internal Component 2	ST 01	Upto 40% (Lectures 1-42)	Week 6	30%
	ST 02	40% - 80% (Lectures 43-84)	Week 12	
	ST 03	100% (Lectures 85-104)	Week 16	
External Component	End Term Examination*	100%		50%
Total				100%

* Minimum 75% attendance is required to become eligible for appearing in the End Semester Examination

13. Format of Evaluation Components:

Type of Assessment	Total Marks	1 Mark MCQ	2 Marks MCQ	5 Marks	10 Marks
Sessional Tests	40	5	5	3	1
End Term Examination	60	5	5	5	2

*****Format for formative assessments will be conveyed prior to the schedule.

14. This Document is approved by:

Designation	Name	Signature
Course Coordinator	**Dr. Ramamani Tripathy**	
Program In-charge/HoD	**Dr. Hakam Singh**	
Pro VC	**Dr. Meenu Khurana**	
Date	**04/07/2023**	

***Incase of revision in earlier document:**

Date of Creation of earlier document	05/07/2023	Percentage of Revision	