University of Sana'a
Faculty of Engineering
Department: Electrical Engineering
Title of the Program: Computer Engineering & Control

Course Specification of Wireless & Wide Area Networks

I. Course Identification and General Information:

1.	Course Title:	Wireless & Wide Area Networks			
2.	Course Code & Number:	CCE453			

		C.H				Total
3.	Credit hours:	Th.	Tu.	Pr.	Tr.	Total
		2	-	2	-	3

4.	Study level/ semester at which this course is offered:	Fifth Level / Second Semester
5.	Pre –requisite (if any):	Computer Programming III (CCE244), Computer and Communication Networks (CCE451)
6.	Co –requisite (if any):	None.
7.	Program (s) in which the course is offered:	Computer & Control Engineering
8.	Language of teaching the course:	English
9.	Location of teaching the course:	Electrical Engineering Department
10.	Prepared By:	Assoc. Prof. Dr. Farouk Al-Fuhaidy
11.	Date of Approval	2020

II.   Course Description:

This course is an advanced course in networking. It aims to provide students with the advanced principles and concepts in wireless and wide area networks. Topics included by this course are; Local Area Network's (LAN) networking and technologies, Wide Area Networks (WAN) infrastructures and technologies, routing protocols & Quality of Service (QoS), and application layer protocols, Wireless Networks Technologies. Laboratory work cover the planning, designing, and implementation of LAN & WAN networks using simulation environment, and the application layer Client-Server programming.

Prepared by	Head of Department	Quality Assurance Unit	Dean of the Faculty	Academic Development
Assoc. Prof. Dr. Farouk Al-Fuhaidy.	Asst. Prof. Dr. Adel Ahmed Al-Shakiri	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1	Demonstrate an understanding of basic principles and advanced concepts in networking related to wireless and wide area networks.	A1
b1	Solve environmental engineering problems related to wired & wireless networks.	B1
b2	Consider economic, social, and environmental dimensions while designing and implementing wide & wireless networks.	B4
c1	Design different types of networks that meet desired specifications, issues, and environmental constraints.	C2
c2	Use standard simulation tools and gained programming skills to the design and implementation of different types of networks.	C4
d1	Enhance student's communication skills through individual and group report/project presentations.	D4

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Demonstrate an understanding of basic principles and advanced concepts in networking related to wireless and wide area networks.	▪ Lectures, ▪ Laboratory work, ▪ Projects, ▪ Use of communication and information technology	▪ Examinations, ▪ Homework and assignments, ▪ Presentations, ▪ Individual and group project reports

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(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Solve environmental engineering problems related to wired & wireless networks.	▪ Lectures, ▪ Laboratory work, ▪ Seminars, ▪ Group work, ▪ Projects, ▪ Use of communication and information technology	▪ Examinations, ▪ Homework and assignments, ▪ Laboratory reports presentations, ▪ Individual and group project reports
b2- Consider economic, social, and environmental dimensions while designing and implementing wide & wireless networks.	▪ Lectures, ▪ Laboratory work, ▪ Seminars, ▪ Group work, ▪ Projects, ▪ Use of communication and information technology	▪ Examinations, ▪ Homework and assignments, ▪ Laboratory reports presentations, ▪ Individual and group project reports

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Design and implement different types of networks that meet desired specifications, issues, and environmental constraints.	▪ Lectures, ▪ Laboratory, ▪ Seminars, ▪ Projects, ▪ Small group ▪ Use of communication and information technology	▪ Examinations, ▪ Laboratory reports, ▪ Presentations, ▪ Individual and group project reports.

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c2- Use standard simulation tools and gained programming skills to the design and implementation of different types of networks.	▪ Lectures, ▪ Laboratory, ▪ Seminars, ▪ Projects, ▪ Small group, ▪ Use of communication and information technology	▪ Examinations, ▪ Laboratory reports, ▪ Presentations, ▪ Individual and group project reports.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Enhance student's communication skills through individual and group report/project presentations.	▪ Seminars, ▪ Laboratory, ▪ Projects, ▪ Use of communication and information technology	▪ Presentations, ▪ Individual and group project Reports

IV. Course Content:					
A – Theoretical Aspect:					
Order	**Units/Topics List**	**Learning Outcomes**	**Sub Topics List**	**Number of Weeks**	**Contact hours**
1.	Course Orientation & Introduction and Local Area Networks (LAN)	a1, b1, b2	▪ Course Orientations, overview on topics, ▪ Introduction to Wireless Networks Technologies, goals, motivations, and Applications	3	6

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			▪ Introduction to Wide Area Networks WAN Technologies, High-Speed Networks Technologies and Their applications ▪ Brief Review on OSI/ISO and TCP/IP Networking Models, layers, addressing and functions. ▪ LAN concepts, functions, applications, requirements, topologies, medium access control protocols: Random Access Techniques such as ALOHA, CSMA/CD to wired and CSMA/CA to wireless, Controlled Access Techniques: such as Token, Reservation and Allocation Access: FDM, TDM and CDMA. ▪ Internetworking methods and techniques such as hub, bridge, switch, router, and gateway.		
2.	High-Speed Networks and WAN Technologies	a1, b1, b2, c1	▪ Introduction to High Speed Networking: Concepts, Features and Applications, ▪ High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel ▪ MAN, Networks concepts, structure, requirements, applications; Cabling Standards; MAN types: Ethernet	4	8

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			MAN, SONET, WMAN such as WiMAX and Broadband Networks ▪ WAN concept, structure, requirements, applications; ▪ WAN Switching: Circuit, Packet, and Virtual Circuit Switching; ▪ Leased Lines & Services: Basic concepts and design issues of leased lines or services used to interconnect enterprise network, Dial-up T-1, E-1, ISDN, DSL & ADSL, FRAM Relay Networks, and VPN ▪ Asynchronous transfer mode (ATM): architecture, logical connection, ATM cell, ATM service categories, AAL.		
3.	WAN Routing Protocols and Congestion & Traffic Management	a1, b1, b2, c1	▪ Routing in WAN, concept and protocols: demonstration of some Network Layer's Routing Protocols. Client-Server Networking, concepts, techniques ▪ Queuing analysis, Queuing models, Queuing discipline and Single server queues ▪ Effects of congestion, ▪ Congestion control ▪ Traffic management ▪ Congestion control in packet switching networks	3	6

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			▪ Frame relay congestion control. ▪ Integrated and Differentiated Services and Quality of Services (QoSs) ▪ TCP and ATM Flow-control: TCP flow control, TCP congestion control, Retransmission, Timer management, Exponential RTO backoff, KARN's algorithm, Window management, Performance of TCP over ATM ▪ Traffic and congestion control in ATM		
4.	Wireless Networking Technologies, WLAN, WiFi, WiMAX, Mesh Ad-hoc, and Wireless Sensor Networks	a1, b1, b2, c1	▪ Wireless Network: concepts, requirements, difference from wired, Mobility ▪ RF Basics: Frequency, modulation, medium access ▪ WiFi Overview: Basic Elements, Standards and Variants, Wireless LANs:802.11 standards, mobility support and Voice & QoS support. ▪ Adhoc Networks: concepts, infrastructures, routing & transport ▪ Wireless Sensor Networks, concepts, applications, Basic Elements, challenges and Routing	4	8

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			Wireless MANs (WiMaX): Basic Elements, 802.16 standard, Voice & QoS support and Security issues. ▪ Trends: Overlay Networks. ▪ Final Revisions		
Number of Weeks /and Units Per Semester				**14**	**28**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1.	▪ Installing Windows Server 2008 or higher and Packet Tracer and any other Cisco/Networks Simulators in the Lab	1	2	b1, c2, d1
2.	▪ Network Administration: ▪ Configure Windows Server 2003: IP Config, Ping, DHCP, DNS, Web Server and Local Host (IIS); Active Directory (User, Group, OU, Group Polices); NTFS; Access Control and security (in the Lab). ▪ Other Network Servers specifications, requirements, and configuration: File Server, Database Server, Application Server, Email Server, Web Server, Internet Server, Print Server, and Backup Server	4	8	a1, b1, b2, c1, c2, d1
3.	▪ Configure VPN – in the Lab; Configure Frame Relay, ATM, and MPLS (GNS3 Emulator, OPNET Simulator and Packet Tracer) ▪ ISDN, DDR and Optical Networking Fundamentals (SONET)	2	4	a1, b1, b2, c1, c2, d1
4.	▪ Scaling IP Addresses and WAN Technologies ▪ Configure Point to Point Protocol (PPP)	2	4	a1, b1, b2, c1, c2, d1

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	▪ Configure Switch and Virtual LANs (VLANs) – in the Lab (Cisco Lab). ▪ Configure Router and Firewall– in the Lab (Cisco Lab).			
5.	▪ RAID Systems concepts, specifications, requirements, and configuration (GNS3 Emulator, SENSE Simulator Emulator, OPNET Simulator and/or Packet Tracer) ▪ Apply one simulator to establish and builds Wireless networks to configure, simulate, and study performance of WSNs/Ad-hoc Routing Protocols ▪ Network applications: Intranet services such as; RAS; NetMeeting, Client-Server Programming, Chat, Forums, Instant Messaging, VoIP, Video Streaming (in the Lab)	3	6	a1, b1, b2, c1, c2, d1
6.	Project Presentation & Discussion	1	2	a1, b1, b2, c1, c2, d1
7.	Review	1	2	a1, b1, b2, c1, c2, d1
Number of Weeks /and Units Per Semester		**14**	**28**	

V. Teaching strategies of the course:

- Active Lectures (whiteboard and data show)
- Interactive class Discussion
- Projects
- Laboratory Work
- Computer-based Lab Work
- Small Groups
- Seminars

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- Use of communication and information technology

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	LAN Networking	a1, b1, b2, c1, d1	3rd	3
2.	High-Speed and WAN Technologies	a1, b1, b2, c1, d1	4th to 7th	4.5
3.	WAN Routing & Congestion Control	a1, b1, b2, c1, d1	9th & 10th	3
4.	Wireless Networks	a1, b1, b2, c1, d1	11th to 15th	4.5
	Total			**15**

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	**Home Works, Assignments & Quizzes**	3rd to 15th Quizzes on (5th & 12th)	15	10%	a1, b1, b2, c1, d1
2.	**Lab Work**	2nd to 12^{lve}	15	10%	a1, b1, b2, c1, c2, d1
3.	**Mid-Term Exam (Th.)**	8th	15	10%	a1, b1, b2, c1
4.	**Project Presentation & Discussion**	13th	15	10%	a1, b1, b2, c1, c2, d1
5.	**Final Exam (Pr.)**	15th	15	10%	a1, b1, b2, c1, c2, d1
6.	**Final Exam (Th.)**	16th	75	50%	a1, b1, b2, c1
	Total		**150**	**100%**	

VIII.   Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

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	1- William Stallings, "High Speed Networks and Internet", 2nd Edition, Pearson Education, 2002. 2- A.S. Tanenbaum. 2003- Computer Networks. Pearson Education, 3- Y-B. Lin and I Chlamtac, 2001- Wireless and Mobile Network Architectures, Wiley. 4- Curt White, 2011, "Data Communications and Computer Networks", Course Technology, 6th Edition, USA.
2- Essential References.	
	1- Behrouz Forouzan, 2007, "Data Communications and Networking", McGraw-Hill, 4th Edition, USA. 2- J. Schiller, 2002- Mobile Communications, Addison Wesley. 3- Jean warland and Pravin Wadaja, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Last Edition, Jean Harcourt Asia Pvt. Ltd.
3- Electronic Materials and Web Sites *etc*.	
	1- 802.11 Wireless LAN, IEEE standards, www.ieee.org 2- Various RFCs: RFC 2002, 2501, 3150, 3449, www.ietf.org 3- Opnet: www.opnet.com 4- GNS3, Packet Tracer: www.cisco.com 5- MCSE material: http://technet.microsoft.com/en-us/network/dd277646.aspx3 6- www.it.iitb.ac.in/~sri 7- www.palowireless.com

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	IX. Course Policies:
1.	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	**Assignments & Projects:** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	**Cheating:** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

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Reviewed By	**Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat**
	President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi
	Name of Reviewer from the Department: Asst. Prof. Dr. Nasser H. Almofari
	Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa
	Assoc. Prof. Dr. Ahmed Mujahed
	Asst. Prof. Dr. Munasar Alsubri

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Template for Course Plan of Wireless & Wide Area Networks

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member	Assoc. Prof. Dr. Farouk Abduh Kamil AL-Fuhaidy	**Office Hours**						
Location& Telephone No.	777909815	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**	
E-mail	farouqakh@gmail.com							

II. Course Identification and General Information:						
1-	Course Title:	Wireless & Wide Area Networks				
2-	Course Number & Code:	CCE453				
3-	Credit hours:	**C.H**				Total
		Th.	Tu.	Pr.	Tr.	
		2	-	2	-	3
4-	Study level/year at which this course is offered:	Fifth Level / Second Semester				
5-	Pre –requisite (if any):	Computer Programming III, Computer and Communications Networks				
6-	Co –requisite (if any):	None.				
7-	Program (s) in which the course is offered	Computer & Control				
8-	Language of teaching the course:	English				
9-	System of Study:	Semesters				
10-	Mode of delivery:	Face-to-face				
11-	Location of teaching the course:	Electrical Eng. Dep.				

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III.	Course Description:

This course is an advanced course in networking. It aims to provide students with the advanced principles and concepts in wireless and wide area networks. Topics included by this course are; Local Area Networks (LAN) networking and technologies, Wide Area Networks (WAN) infrastructures and technologies, routing protocols & Quality of Service (QoS), and application layer protocols, Wireless Networks Technologies. Laboratory work cover the planning, designing, and implementation of LAN & WAN networks using simulation environment and, the application layer Client-Server programming.

IV.	Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

1. Demonstrate an understanding of basic principles and advanced concepts in networking related to wireless and wide area networks.
2. Solve environmental engineering problems related to wired & wireless networks.
3. Consider economic, social, and environmental dimensions while designing and implementing wide & wireless networks.
4. Design different types of networks that meet desired specifications, issues, and environmental constraints .
5. Use standard simulation tools and gained programming skills to the design and implementation of different types of networks.
6. Enhance student's communication skills through individual and group report/project presentations.

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		V. Course Content:		
		A – Theoretical Aspect:		
Order	**Units/Topics List**	**Sub Topics List**	**Number of Weeks**	**Contact hours**
1.	Course Orientation & Introduction and Local Area Networks (LAN)	▪ Course Orientations, overview on topics, ▪ Introduction to Wireless Networks Technologies, goals, motivations, and Applications ▪ Introduction to Wide Area Networks WAN Technologies, High-Speed Networks Technologies and Their applications ▪ Brief Review on OSI/ISO and TCP/IP Networking Models, layers, addressing and functions. ▪ LAN concepts, functions, applications, requirements, topologies, medium access control protocols: Random Access Techniques such as ALOHA, CSMA/CD to wired and CSMA/CA to wireless, Controlled Access Techniques: such as Token, Reservation and Allocation Access: FDM, TDM and CDMA. ▪ Internetworking methods and techniques such as hub, bridge, switch, router, and gateway.	1st ,2nd ,3rd	6
2.	High-Speed Networks and WAN Technologies	▪ Introduction to High Speed Networking: Concepts, Features and Applications, ▪ High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel	4th ,5th ,6th ,7th	8

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		• MAN, Networks concepts, structure, requirements, applications; Cabling Standards; MAN types: Ethernet MAN, SONET, WMAN such as WiMAX and Broadband Networks • WAN concept, structure, requirements, applications; • WAN Switching: Circuit, Packet, and Virtual Circuit Switching; • Leased Lines & Services: Basic concepts and design issues of leased lines or services used to interconnect enterprise network, Dial-up T-1, E-1, ISDN, DSL & ADSL, FRAM Relay Networks, and VPN • Asynchronous transfer mode (ATM): architecture, logical connection, ATM cell, ATM service categories, AAL.		
3.	Mid-Term Exam	• ALL Topics	8th	2
4.	WAN Routing Protocols and Congestion & Traffic Management	• Routing in WAN, concept and protocols: demonstration of some Network Layer's Routing Protocols. Client-Server Networking, concepts, techniques • Queuing analysis, Queuing models, Queuing discipline and Single server queues • Effects of congestion, • Congestion control • Traffic management	9th ,10th ,11th	6

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		▪ Congestion control in packet switching networks ▪ Frame relay congestion control. ▪ Integrated and Differentiated Services and Quality of Services (QoSs) ▪ TCP and ATM Flow-control: TCP flow control, TCP congestion control, Retransmission, Timer management, Exponential RTO backoff, KARN's algorithm, Window management, Performance of TCP over ATM ▪ Traffic and congestion control in ATM		
5.	Wireless Networking Technologies, WLAN, WiFi, WiMAX, Mesh Ad-hoc, and Wireless Sensor Networks	▪ Wireless Network: concepts, requirements, difference from wired, Mobility ▪ RF Basics: Frequency, modulation, medium access ▪ WiFi Overview: Basic Elements, Standards and Variants, Wireless LANs:802.11 standards, mobility support and Voice & QoS support. ▪ Adhoc Networks: concepts, infrastructures, routing & transport ▪ Wireless Sensor Networks, concepts, applications, Basic Elements, challenges and Routing ▪ Wireless MANs (WiMaX): Basic Elements, 802.16 standard, Voice & QoS support and Security issues. ▪ Trends: Overlay Networks.	12th ,13th ,14th ,15th	8

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Prof. Dr. Mohammed
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		▪ Final Revisions		
6.	Final Exam	All Topics	16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours
1.	▪ Installing Windows Server 2008 or higher and Packet Tracer and any other Cisco/Networks Simulators in the Lab	1st	2
2.	▪ Network Administration: ▪ Configure Windows Server 2003: IP Config, Ping, DHCP, DNS, Web Server and Local Host (IIS); Active Directory (User, Group, OU, Group Polices); NTFS; Access Control and security (in the Lab). ▪ Other Network Servers specifications, requirements, and configuration: File Server, Database Server, Application Server, Email Server, Web Server, Internet Server, Print Server, and Backup Server	2nd ,3rd ,4th ,5th	8
3.	▪ Configure VPN – in the Lab; Configure Frame Relay, ATM, and MPLS (GNS3 Emulator, OPNET Simulator and Packet Tracer) ▪ ISDN, DDR and Optical Networking Fundamentals (SONET)	6th ,7th	4
4.	▪ Scaling IP Addresses and WAN Technologies ▪ Configure Point to Point Protocol (PPP) ▪ Configure Switch and Virtual LANs (VLANs) – in the Lab (Cisco Lab). ▪ Configure Router and Firewall– in the Lab (Cisco Lab).	8th ,9th	4

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5.	▪ RAID Systems concepts, specifications, requirements, and configuration (GNS3 Emulator, SENSE Simulator Emulator, OPNET Simulator and/or Packet Tracer) ▪ Apply one simulator to establish and builds Wireless networks to configure, simulate, and study performance of WSNs/Ad-hoc Routing Protocols ▪ Network applications: Intranet services such as; RAS; NetMeeting, Client-Server Programming, Chat, Forums, Instant Messaging, VoIP, Video Streaming (in the Lab)	10th ,11th ,12th	6
6.	Project Presentation & Discussion	13th	2
7.	Review	14th	2
8.	Final Exam	15th	2
Number of Weeks /and Units Per Semester 14			28

VI.   Teaching strategies of the course:

- Active Lectures (whiteboard and data show)
- Interactive class Discussion
- Projects
- Laboratory Work
- Computer-based Lab Work
- Small Groups
- Seminars
- Use of communication and information technology

VII.   Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	LAN Networking	a1, b1, b2, c1, d1	3rd	3

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2.	High-Speed and WAN Technologies	a1, b1, b2, c1, d1	4th to 7th	4.5
3.	WAN Routing & Congestion Control	a1, b1, b2, c1, d1	9th & 10th	3
4.	Wireless Networks	a1, b1, b2, c1, d1	11th to 15th	4.5
	Total			**15**

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Home Works, Assignments & Quizzes	3rd to 15th Quizzes on (5th & 12th)	15	10%
2.	Lab Work	2nd to 12th	15	10%
3.	Mid-Term Exam (Th.)	8th	15	10%
4.	Project Presentation & Discussion	13th	15	10%
5.	Final Exam (Pr.)	15th	15	10%
6.	Final Exam (Th.)	16th	75	50%
	Total		**150**	**100%**

IX. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

	1. William Stallings, "High Speed Networks and Internet", 2nd Edition, Pearson Education, 2002.
	2. A.S. Tanenbaum. 2003- Computer Networks. Pearson Education,
	3. Y-B. Lin and I Chlamtac, 2001- Wireless and Mobile Network Architectures, Wiley.
	4. Curt White, 2011, "Data Communications and Computer Networks", Course Technology, 6th Edition, USA.

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	2- Essential References.
	1. Behrouz Forouzan, 2007, "Data Communications and Networking", McGraw-Hill, 4th Edition, USA. 2. J. Schiller, 2002- Mobile Communications, Addison Wesley. 3. Jean warland and Pravin Wadaja, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Last Edition, Jean Harcourt Asia Pvt. Ltd.
	3- Electronic Materials and Web Sites *etc*.
	1. 802.11 Wireless LAN, IEEE standards, www.ieee.org 2. Various RFCs: RFC 2002, 2501, 3150, 3449, www.ietf.org 3. Opnet: www.opnet.com 4. GNS3, Packet Tracer: www.cisco.com 5. MCSE material: http://technet.microsoft.com/en-us/network/dd277646.aspx3 6. www.it.iitb.ac.in/~sri 7. www.palowireless.com

	X. Course Policies:
1.	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	**Assignments & Projects:**

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	The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	**Cheating:** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	**Plagiarism:** Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

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