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ECE Dept
Exam.
Internal Assessment
Even Sem(2017-18)

THIRD INTERNAL ASSESSMENT

Sem: VIII **Sub: High Performance Computer Network** **Sub. Code: 10EC834**

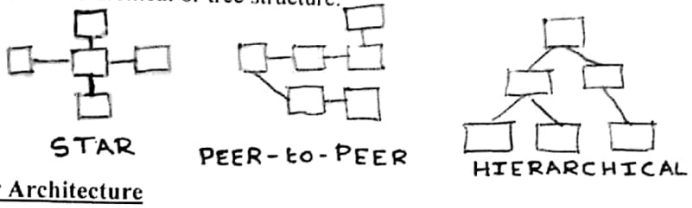
Date: 19/05/18 **Time: 11:00am-12:00noon** **Max. Marks: 25**

Note: Answer two full questions, draw sketches wherever necessary.

Q. No		Discription of Question	Marks	CO	RBT Level
1	a	Explain different architectures of wireless network.	6	C411D4.5	L1,L2,L3,L4
		OR			
	b	Explain channel access with multiple access, random access and spectral etiquette.	6	C411D4.5	L1,L2,L3,L4
	c	Explain cellular systems.	6	C411D4.5	L1,L2,L3,L4
		OR			
	d	Write a short note on Ad-Hoc wireless networks, Home RF and Bluetooth.	6	C411D4.5	L1,L2,L3,L4
2	a	Explain FTP, SMTP,TFTP and HTTP.	7	C411D4.3	L1,L2,L3,L4
		OR			
	b	Explain window adjustment in TCP with suggested improvement for TCP.	7	C411D4.3	L1,L2,L3,L4
	c	Explain WDM system with a neat diagram.	6	C411D4.6	L1,L2
		OR			
	d	Describe optical LANs with Singlehop and Multihop optical LANs	6	C411D4.6	L1,L2

Course Coordinator **Module Coordinator** **HOD**

SCHEME OF EVALUATION IA-III

Sem :VIII		Subject : High Performance Computer Network	Sub Code : 10EC834		Date:21/05/2018
Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
1	*a*	**Explain different architectures of wireless network.** The three main types of network architectures are 1. Star (central hub) topology 2. An ad hoc or peer-to-peer structure 3. Hierarchical or tree structure.	6 1	C411D4.5	L1,L2,L3, L4
			2		
		Star Architecture In a star architecture, communication flows from network nodes to a central hub over one set of channels, and from the hub to the nodes over a separate set of channels. star architectures have only one hop between a network node and the central hub, they tend to be more predictable and reliable	1		
		An ad hoc or peer-to-peer structure Nodes are self-configure into an integrated network using distributed control, and the connection between any two nodes in the network consists of one or more peer-to-peer communication links. It Require no existing infrastructure Easily reconfigurable, and have no single points of failure. **Advantage:** Peer-to-peer architectures can use multiple hops for the end-to-end connection,.	1		
		Hierarchical or tree structure. Hierarchical network architectures are usually only used for wireless networks spanning a range of coverage regions, as was shown in figure. Lowest level of the hierarchy consists of indoor systems with small coverage areas; the next level of the hierarchy consists of cellular systems coyering a city, followed by systems with regional and then global coverage. hierarchical network architecture along with protocols used for routing and identifying user locations.	1		
1	*b*	**Explain channel access with multiple access, random access and spectral etiquette.**	6	C411D4.5	L1,L2,L3, L4
		Multiple access Multiple access techniques assign dedicated channels to multiple users through bandwidth division. Methods to divide spectrum includes 1) Frequency division multiple access 2) Time division multiple access 3) code division multiple access In FDMA total system bandwidth is divided into orthogonal channels that are nonoverlapping in frequency and are allocated to different users. In TDMA time is divided into nonoverlapping time slots that are allocated to different users In CDMA time and bandwidth are used simultaneously by different users,	2		

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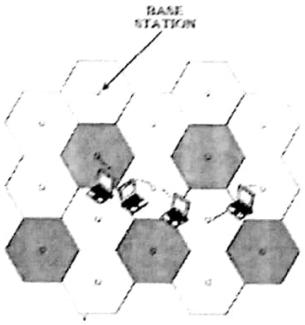
		Random access In most wireless data networks only a small, unpredictable, and changing subset of all the users in the network has data to send at any given time. For these systems it is inefficient to assign each user a dedicated channel. When dedicated channel access is not provided and access to the channel is not guaranteed, a random access protocol is required. Random access protocols are based on packetized data transmissions and typically fall in two categories: 1) ALOHA techniques 2) Reservation or demand-assignment protocols.	2		C411D4.5	L1,L2,L3, L4
		Spectral Etiquette Spectral Etiquette rules which are a minimum set of rules that allow multiple systems to share the available bandwidth fairly. These techniques offer an alternative to standardization methods that require agreement on channel access and system design before systems can be built and deployed. The key elements of these etiquette rules are: (1) Listen before transmitting (2) Limit transmission time (3) Limit transmitter power	2			
1	c	**Explain cellular systems.**	6		C411D4.5	L1,L2,L3, L4
		 *Cellular systems with frequency reuse*	2			
		• Cellular telephone systems, also referred to as Personal Communication systems (PCS), are extremely popular and lucrative worldwide. • These systems have sparked much of the optimism about the future of wireless networks. • Cellular telephone systems are designed to provide two-way voice communication at vehicle speeds with regional or national coverage. • Cellular systems were initially designed for mobile terminals inside vehicles with antennas mounted on the vehicle roof. • The basic feature of the cellular system is frequency reuse • Operation within a cell is controlled by a centralized base station. The interference caused by users in different cells operating on the same channel set is called intercell interference. • The cell base stations were placed on tall buildings or mountains and transmitted at very high power with cell coverage areas of several square miles. These large cells are called macrocells.	4			

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Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
		• Cellular telephone systems are now evolving to smaller cells with base stations inside buildings transmitting at much lower power. These smaller cells are called picocells, depending on their size.			
1	d	**Write a short note on Ad-Hoc wireless networks, Home RF and Bluetooth.**	6	C411D4.5	L1,L2,L3, L4
		Ad-Hoc wireless networks			
		• An ad-hoc wireless network is a **collection of wireless mobile hosts forming a temporary network** without the aid of any established infrastructure or centralized control.	2		
		• Ad-hoc wireless networks were traditionally of interest to the **military.**			
		• Throughout the 70s and 80s **DARPA funded much work in the design of ad-hoc packet radio networks,** however the performance of these networks was somewhat disappointing.			
		• Ad-hoc wireless networks are now being considered for many commercial applications, including in-home networking, wireless LANs, and short-term networking public events, and offices.			
		Home RF			
		• HomeRF is an RF standard in the 2-GHz frequency band for wireless home networking.	2		
		• The standard was initiated by Intel, HP, Microsoft, Compaq, and IBM to enable communications and Internet connectivity among different electronic devices in and around the home			
		• The data rate for HomeRF is specified as 2 Mbps, with simultaneous support for voice and data, at a range of 50 meters.			
		• The HomeRF standard is expected to be finalized sometime in 1999, with products incorporating the standard introduced sometime in the year 2000.			
		Bluetooth			
		• Bluetooth is a cable-replacement RF technology for short-range connections (less than 10 meters) between wireless devices.	2		
		• Its main application is to connect digital cellular phones, laptop and palmtop computers, portable printers and projectors, network access points, and other portable devices without the need to carry or connect cables.			
		• The Bluetooth standard was initiated by Ericsson, IBM, Intel, Nokia, and Toshiba			
		• The system operates in the 2.4-GHz frequency band with data rates of 700 Kbps for data and up to three voice connections at 64 Kbps.			
2	a	**Explain FTP, SMTP,TFTP and HTTP.**		C411D4.3	L1,L2,L3, L4
		FTP	7		
		• The File Transfer Protocol enables users to transfer files between computers. As figureshows, FTP opens two connections between the computers.			
		• One connection for the commands and replies. Another connection for the data transfers.	2		

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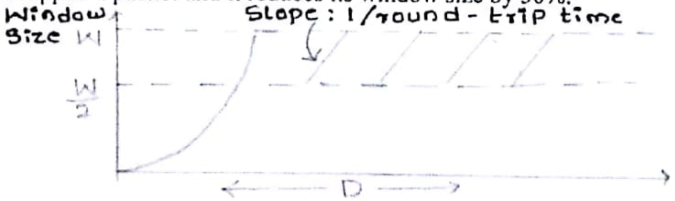
		• FTP is interactive. Its commands are send, get, transfer, and cd (change directory). FTP transfers files in information modes: stream, block, and compressed. • In the stream mode, FTP handles information as a string of bytes without separating boundaries. **SMTP** • The Simple Mail Ransfer Protocol (SMTP) is used for e-mail. • SMTP accepts messages with a list of destinations. When it does not succeed in• delivering message, SMTP retries a number of times, and it notifies the sender if it cannot deliver the message. **TFTP** • The Trivial File Transfer Protocol (TFTP) transfers data as blocks of 512 bytes. • TFTP sends one block of 512 bytes and waits for an acknowledgment, TFT'P retries after a timeout until it succeeds and then proceeds to the next block. • TFTP numbers the blocks sequentially from 1. This robust protocol operates even when the transport layer is of low quality. **HTTP** • The Hypertext Transfer Protocol (HTTP) is the basis for access over the World Wide Web to resources referenced by their URL. • The success of the Web is virtually due to the flexibility of HTTP. • The HTTP protocol is a request/response protocol on top of TCP.	1 2 2			
2	*b*	**Explain window adjustment in TCP with suggested improvement for TCP.** The TCP window adjustment mechanism starts by increasing the window Size exponentially fast to "discover" the available transmission rate. When the source fails to get an acknowledgment, it suspects that a router has dropped a packet and it reduces its window size by 50%.  First, a active connection with a small round trip time is much more aggressive than one with a large one, Consequently if connections with different round-trip times share a router. The ones with the smaller round-trip times are likely to grab most of the link capacity. note that TCP loses approximately one packet every D=TW/2 seconds where T is the round-trip time (see figure). In D seconds, the connection sends approximately W/2 + (W/2 +1) +……+ 2W/2 3W2 /8 units. Assume that one unit is K average packets. Thus, if we designate by R=3KW2 /8D=3KW/4T the throughput of the connection (in packets/s) and by L=1/(3W2 /8)=8/3W2 its loss rate, then we find that $R=\frac{1.25K}{T\sqrt{L}}$	7 2 2		C411D4.3	L1,L2,L3, L4

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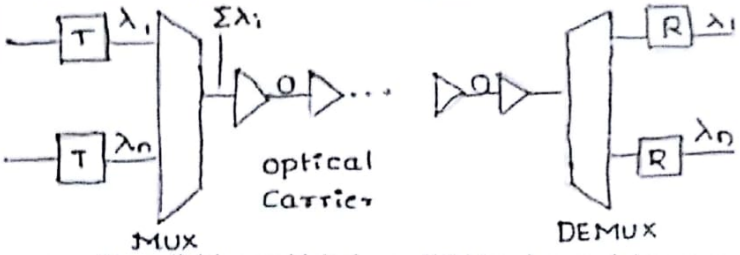
SCHEME OF EVALUATION IA-III

Sem : VIII		Subject : High Performance Computer Network	Sub Code : 10EC834	Date:21/05/2018	
Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
		Suggested improvement for TCP : To improve the behavior shown in above Figure Internet researchers suggested the following improvements for TCP: • Increase the window size at a rate that is independent of the round-trip time. • Base the window adjustment mechanism on delays, not on losses.Have the routers mark the packets to indicate that they are getting congested insteadof waiting until they have to drop packets. • Base the decision to drop packets on the number of packets of the same connection in the router, not simply on the total number of packets. • Have the routers provide the sources with a more explicit indication of the available transmission rate. • Merge acknowledgements on a slow reverse link. • Introduce a link error control mechanism for noisy links. • Cheat and modify your TCP window adjustment mechanism.	3		
2	c	**Explain WDM system with a neat diagram.** 	6 3	C411D4.6	L1,L2
		• Wave division multiplexing or WDM makes much better use of this bandwidth. WDM divides the window into n channels centered at different wavelengths or light "colors," λ1…….λn. • Light of each wavelength is generated by a separate laser modulated independently.The N modulated lightwaves are combined together and transported over the same fiber. At the receiver, a filter selects the desired channel or wavelength, the lightwave signal is demodulated and the modulating signal is recovered. • Figure depicts a WDM link. The transmit portion comprises n laser transmitters (T), one for each of n wavelengths, λi The n modulated lightwaves are combined (multiplexed) by a passive coupler, amplified, and launched into the fiber. The fiber comprises several spans, each terminated by in optical amplifier. • The amplifier compensates for the loss in signal strength over one span and extends the length of WDM links without conversion to the electrical domain. The bandwidth of optical amplifiers today is limited to about 5,000 GHz • The number of spans that can form a single link, before signal regeneration is required, is limited by distortion introduced by the fiber nonlinearities and amplifier noise. • At the end of the link the received light signal is amplified and demultiplexed	3		

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Q. No.	Bit	Description	Marks	CO's	RBT LEVEL
2	d	**Describe optical LANs with Singlehop and Multihop optical LANs.**	6	C411D4.6	L1,L2

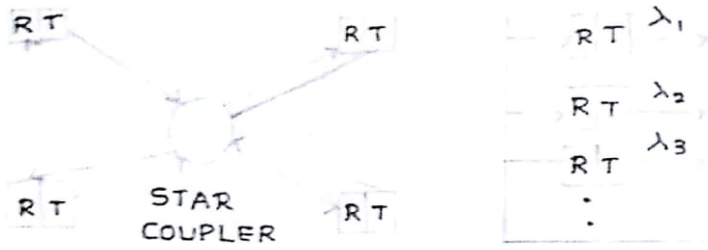

Figure A, illustrates two optical LANs.

- The star coupler on the left combines the signals from the four transmitters and splits it into four signals sent to each receiver. — 1.5
- In the bus arrangement on the right, the signal transmitted by each signal is coupled into the bus. The signal on the bus is split to feed each receiver. Thus the signals from all the transmitters are broadcast to all the receivers. Each station transmits on one wavelength, but it receives all the wavelengths. — 1.5
- Two arrangements are possible. Either each station has a tunable transmitter (laser) that can be tuned to the desired wavelength, or it has a tunable receiver that can select the desired wavelength.
- The convention is to write FT or TT for a fixed or tunable transmitter respectively, and similarly FR or TR for receivers.

Figure B: multihop shuffle network. Each station transmits and receives on two fixed wavelengths — 1.5

- The LANs of Figure are single-hop, since each station is one hop away from the others. — 1.5
- Single-hop LANs don't scale easily and require tunable receivers.
- An alternative arrangement is offered by multihop networks with fixed receiver and transmitter wavelengths.
- Figure is an example of an 8-node shuffle network. Each node transmits and receives two wavelengths.
- Suppose 1 is used on the upper link and 2 lower link. (Links are directed from left to right.) If node 0 wants to transmit a packet to node 6, it can send the packet via the route 0-4-1-6 or 0-5-3-6.

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