

MODEL ANSWER

SUMMER – 2018 EXAMINATION

Subject: Data Communication & Networking

Subject Code:

17430

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No	Sub Q.N.	Answer	Marking Scheme
1.	A) a) Ans.	Attempt any six of the following: What is data communication? Data communication is the exchange of data between two devices via some form of transmission medium such as a wire cable. For data communications to occur, the communicating devices must be part of a communication system made up of a combination of hardware (physical equipment) and software (programs).	12 2M Definitio n 2M
	b)	Define guided and unguided media.	2M
	Ans.	 Guided media -The signal energy that propagates within the guided media .i.e. through wires. It is mainly suited for point to point line configurations. The signal propagates in the form of voltage, current or photons. Examples of guided media are:- Twisted Pair Cable, Coaxial Cable, Optical Fiber Cable. Unguided media - The signal energy that propagates through air. It is mainly used for broadcasting purpose. The signal propagates in the form of electromagnetic waves. Examples are:- Microwave or Radio Links Infrared 	Each definitio n 1M



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c)	What is Error? Enlist types of errors.	2M
An	Any distortion or noise occurred during the process of transmission	Definitio
	or reception can be termed as error.	n 1M
	Types of errors:	Any 2
	1. Delay distortion	types
	2. Attenuation	1/2 M
	3. Noise	each
d)	What is SMDS?	2M
An	1) Switched Multimegabit Data Services (SMDS) is a high speed	
	MAN technology.	SMDS
	2) It is a packet switched datagram service for high speed MAN data	<i>2M</i>
	transmission.	
e)	What is Encapsulation?	2M
	(Note: Any relevant explanation or diagram shall be considered.)	
An	The protocols operating at the various layers work together to supply	
	a unified quality of service. Each protocol layer provides a service to	Definitio
	the layers directly above and below it. The process of adding the	n 2M
	headers and trailers to the data is called as data encansulation	10 2101
	OR	
	A packet(header and data) at level 7 is encapsulated in a packet at	
	level 6 The whole packet at level 6 is encapsulated in a packet at level	
	5 and so on. In other words, the data portion of a packet at level N-1	
	carries the whole packet (data and header and maybe trailer) from	
	level N. The concept is called enconsulation	
	level N. The concept is called encapsulation.	
	APPLICATION Application Data	
	PRESENTATION	
	The market of the second s	
	TRANSPORT Transport Application	
	header Data	
	NETWORK Network Transport-layer PDC	
	Data link Data link Network-layer PDU Data link footer	
	Data link-layer PDU	
	PHYSICAL	
	Network medium	
	OR	



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f)	What are the problems in Internetworking?	2M
	(Note: Any relevant problem shall be considered)	
Ans.	The different problems that occur in Internetworking are:	
	1. Addressing: Each network might have its own addressing modes.	Any two
	For example Ethernet uses o byte identifier while telephone uses	problem 1M each
	ii Bandwidth and Latency: Heterogeneity in bandwidth ranges from	I'm each
	small no of bits to many Gigabits spanning many order of	
	magnitudes. Similarly latency can range from microseconds to several seconds	
	iii. Packet Size: the maximum packet size will vary between different	
	networks.	
	iv. Loss rates: Network differ widely in the loss rates and loss	
	patterns of the links.	
	v. Packet Routing: packet routing can be handled differently by each constituent network	
g)	What is router? List types of router.	2M
Ans.	Router is network layer device that routes packets based on their	
	logical address (host to host address). Router normally connects LAN	
	and WANS in the internet using route information stored in routing	Definitio
	table Routing table of router is tabular database which stores	n IM
	with to reach) information routing table is undated dynamically	
	depending on changes in network.	



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		 Two types of routers are: 1. Static routers: A router with manually configured routing tables is known as a static router 2. Dynamic routers: A router with dynamically configured routing tables is known as a dynamic router. Dynamic routing consists of routing tables that are built and maintained automatically through an ongoing communication between routers. 	Any 2 types ½ M each
	h)	What is IP Address? Why it is required?	2M
	Ans.	IP address is a logical address, 32 bit address having network_id & host_id that uniquely & universally identified over network or local network or to internet. Messages are routed in a network based on destination IP address. It has five classes: Class A, B,C,D,E. OR IP Address: IP Address is used in the source & destination address fields of the IP header it is 32 bit long. Each device has a unique IP Address.	Definitio n 1M
		 Need: 1. In a internetwork each device/computer should have unique address for identification and communication. IP addressing provides that facility. 2. In order to communicate with other devices in the network, there needs a global addressing scheme. IP addresses are used for logically addressing the computers. 3. It provides a network address and host address so routing becomes easy task. 4. It gives facility of subnetting and supernetting. 	Any 2 require ment ½ M each
1.	B)	Attempt any two of the following:	8
	a) Ans.	Explain virtual LAN with its two benefits. Virtual LANs (VLANs) are logical local area networks (LANs) based	4 M
		on physical LANs. A VLAN can be created by partitioning a physical LAN into multiple logical LANs using a VLAN ID. Alternatively, several physical LANs can function as a single logical LAN. The partitioned network can be on a single router, or multiple VLAN's can be on multiple routers just as multiple physical LAN's would be.	Definitio n 2M



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	Benefits of Virtual LAN are: 1) Ease of administration 2) Confinement of broadcast domains 3) Reduced broadcast traffic 4) Enforcement of security policies.	Any two benefits 1M each
b) Ans.	 Describe any four advantages of fiber optic cable. Advantages of fiber optic cable: Less signal attenuation: Fiber-optic transmission distance is significantly greater. No EMI (Electro Magnetic Interference): No effect of External environmental condition High Band width up to 2 GBPS Noise resistance: Uses light signal rather than electricity Higher data transfer rate Lesser repeater are required Resistance to corrosive materials: Glass is more resistant to corrosive materials than other. Light weight: Fiber-optic cables are much lighter than other cables. Electrical isolation: - Optical fibers (COF) are fabricated from 	4M Any 4 advanta ges 1M each
	 cables. 9. Electrical isolation: - Optical fibers (COF) are fabricated from glass or plastic polymers which are electrical insulators. Hence they do not exhibit earth loop. 	



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		10. Signal security: - The light from OF does not radiate			
		significantly & th	herefore they provide a	high degree of signal	
		security.			
	c)	List various stand	lard organisations for	data communication.	4 M
	Ans.	Various Standard	l Organizations for da	ta communications are the	
		following:			
		a. International C	rganization for Standar	dization (ISO).	Any 4
		b. International	Telecommunication	Union-Telecommunication	organisa
		Standards Sect	or (ITU-T).		tions 1M
		c. American Nati	onal Standards Institute	e (ANSI).	each
		d. Institute of Ele	ctrical and Electronics	Engineers (IEEE).	
		e. Electronic Indu	stries Association (EIA	A).	
2.		Attempt any four	of the following:		16
	a)	Differentiate betw	veen serial and paralle	el transmission.	4M
	Ans.	Specifications	Serial	Parallel Transmission	
			Transmission		
		Number of bits	1 bit	n bits	
		transmitted at			
		one clock pulse			
		Number of lines	1 line	n lines	Any 4
		required to			differen
		transmit n bits			ces 1M
		Speed of	Slow	Fast	each
		transfer			
		Cost of	Low, as one line is	High, as n lines are	
		Transmission	needed for	needed for transmission.	
			transmission.		
		Application	Used for long	Used for short distance	
			distance	communication. For	
			communication	example, between	
			between the two	computer and printer.	
			computers.		
		Specifications	Serial Transmission	Parallel Transmission	
			• •		47.5
	b)	Explain Microwa	ve communication.		4M
	Ans.	Microwave com	nunication is the tra	insmission of signals via	
		microwave towe	rs. The microwave ba	and is well suited for	
		wireless transmiss	ion of signals having l	arge bandwidth. In case of	



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	 Microwave transmission, above 100 MHz, the waves travel in straight lines and can therefore be narrowly focused. Concentrating all the energy into a small beam using a parabolic antenna gives a much higher signal to noise ratio. Since the microwaves travel in a straight line, if the towers are too far apart, the earth will get in the way. Consequently, repeaters are needed periodically. Disadvantages: > Do not pass through buildings well > multipath fading problem (the delayed waves cancel the signal) > absorption by rain above 8 GHz > severe shortage of spectrum Advantages: > no right way is needed (compared to wired media) > relatively inexpensive > simple to install 	Explana tion 4M		
c)	Describe the characteristics of data communication system.	4M		
An	s. The effectiveness of any data communications system depends upon			
	the following four fundamental characteristics:			
	1. Delivery : The data should be delivered to the correct destination			
	and correct user.	characte		
	2. Accuracy: The communication system should deliver the data	ristic		
	accurately, without introducing any errors. The data may get	with		
	corrupted during transmission affecting the accuracy of the	explanat		
	delivered data.	ion 1M		
	3. Timeliness : Audio and Video data has to be delivered in a timely			
	manner without any delay; such a data delivery is called real time			
	transmission of data.			
	4. Jitter : It is the variation in the packet arrival time. Uneven Jitter			
	may affect the timeliness of data being transmitted.			
d	Explain the functions of Network Layer in OSI model.	4M		
An	Network layer: It is responsible for routing the packets within the			
	subnet i.e. from source to destination. It is responsible for source e to			
	destination delivery of individual packets across multiple networks. It			
	ensures that packet is delivered from point of origin to destination.	Any 4		
	Functions of network layer:	function		
	1) Logical addressing	s 1M		
	2) Routing.	each		
	3) Congestion control			
	4) Accounting and billing			

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	5) Address transformation		
	6) Source host to destination host error free delivery of packet		
e)	Describe the following: i) Wi-Fi ii) Wi-MAX.	4M	
Ans	i. Wi-Fi		
	 Wi-Fi is the name of a popular wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections Wi-Fi is simply a trademarked phrase that means IEEE 802.11. IEEE 802.11 wireless LAN: The 802.11 architecture define two types of services and three different types of stations. 802.11 services: The two types of services are 1) Basic services set (BSS) 2) Extended services set (ESS) 		
	Basic services set (BSS)	010 2111	
	 Basic services set (BSS) 1) The basic services set contain stationary or mobile wireless station and central base station called access point (AP) 2) The use of access point is optimal 3) If the access point is not present, it is known as standalone network. Such a BSS cannot such data to other BSSs. These types of architecture are known as adhoc architecture. 4) The BSS in which an access point is present is known as infrastructure network. 		
	BSS: Basic service set AP: Access point Station Station Station AP Station AP Station AP Station AP Station AP Station AP Station Station AP Station AP Station Station AP Station Station AP Station Station AP Station Station AP Station Station		
	1) An extended service set is created by initializing two or more basic		
	services set (BSS) having access points (APS)		



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		 Internet Access 1) Wi-Max is capable of providing at home or mobile internet access across the whole city or country. 2) It is cheap to use Wi-Max to provide Internet Access to the remote locator 	
	f)	What is FDDI? Explain its working in details.	4 M
	Ans.	The Fiber Distributed Data Interface (FDDI) network architecture is a LAN protocol standardized by ANSI and other organizations. It supports data transmission rates of up to 100 Mbps, and is an alternative to Ethernet and Ring architectures. Originally, FDDI was developed using optical fiber as the transmission medium because only optical fibre could support data rates of 100 Mbps. FDDI uses glass fibers for data transmission. And therefore, encodes data bits in the form of pulses of light.	Definitio n 2M
		The working of FDDI can be summarized as follows: Token passing for Media Access Control- Like the Token Ring Protocol, FDDI also uses the concept of a token frame to regulate medium access. The same principles of token frame apply here. FDDI is also a ring-like structure where the network medium starts from a computer, passes through all the hosts in the network, and ends back at the original host. Self mechanism- the hardware in FDDI provides mechanism for detecting and correcting problems on its own. When a network error occurs, or a host is down, the NIC uses the second ring which is used as a backup for such failures for data transmission. This is called loop back. Whenever the first ring fails or a host on a ring fails, the second ring is used to create another closed loop.	Working 2M
3.		Attempt any four of the following:	16
	a)	Describe the various IP Address classes.	4 M
	Ans.	IP address: It is a unique address specified in the TCP/IP used to	
		Identity the host in a computer network. It can be a 32 bit address ($IPv4$) or a 128 bit address ($IPv6$)	
		There are five different classes or formats of IP address are as given below: Class A: Class A type of IP addresses have First byte consisting of	Descript ion 3M



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	Network addre	ess w	ith first b	oit as 0 and th	e next 3 byte	s with host id.	
	Hence, number	er of	f hosts a	re more when	n compared	to number of	
	networks.						
	Class B: This	typ	e has firs	t two bytes s	pecifying net	work ID with	
	starting two bi	ts as	10 and la	st two bytes re	eferring to ho	st ID.	
	Class C: This	cla	ss has fir	st three bytes	referring to	network with	
	starting bits as	3 110) and last	byte signifies	Host ID. He	ere, number of	
	networks are	mor	e when	compared to	number of	hosts in each	
	network.			-			
	Class D: Class	D is	s used for	multicasting a	and its startin	g bits are 1110	
	Class E: Clas	s E	is reserve	d for future u	use and its st	arting bits are	
	1111					-	
	Class A		petid (7 kit)	had	1.1.1.204 (FB)		
		Ľ	netiu (riut)	nos	t ia (24 bit)		
	Chan P			i			Diagram
	Cidas D	10	net id (14 bit)	host id (1	6 bit)	<i>1M</i>
	Class C	110	net i	d (21 bit)		host id (8 bit)	
	Class D	1110					
		''''		multica	ast (20 dit)		
	Class F	.	_				
		11111	D	future	use (27 bit)		
		Fig	: Format	s of classes of	IP address		
b)	Compare TC	P an	d UDP (4	points only).			4 M
Ans.				ТСР	1	UDP	
	Working		Full-Fea	tured Protoco	ol Simple,	High Speed,	
			that allo	ws application	ns Low	Functionality	
			to send	data reliabl	ly "wrapper	Interface"	Any 4
			without	worrying abou	ut That	Interfaces	compari
			N/w laye	er issues	applicatio	on to network	son 1M
			2		layer		each
	Protocol		Connect	ion-oriented;	Connectio	onless;	



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		Connection	Connection must be	Data is sent without	
			established prior to	setup	
			transmission		
		Data Interface	Stream-based; Data is	Message-Based; Data	
		to Application	sent by appin with no	is sent in discrete	
		Reliability and	Paliable	Unreliable	
		Ack	With acknowledgement	Without	
			with deknowledgement	acknowledgement	
		Retransmission	Lost data is	Not Performed	
			retransmitted	1 (ot i chronnicu	
			automatically		
		Features	Flow control using	No Flow control	
			sliding window		
			protocol, Congestion		
			avoidance algorithm		
		Transmission	High, but not as UDP	Very High	
		Speed			
	c)	With the help of c	liagram describe Internet	t Topology.	4M
	Ans.	Internet topology	: Internet topology is the s	structure by which hosts,	Density
		routers or autonom	ous systems (ASes) are co	onnected to each other. It	Descript
		is representation (of interconnection of details	host routers connects to	10N 21VI
		each other It is org	anized in hierarchical man	ner as shown in figure.	
		\subset	Very High Speed Backbone (MCI-operated)	Backbone	
		1	+	This Conference coordinas	
				Natwork Access	
		Washington	California New York	Provider s (NAP)	Diagram
		(MFS)	(PacBell) (Sprint)		<i>2M</i>
		,		and of the second second as	
		MCI Sprir	AT&T AOL UU	INet Providers (ISP)	
		a an mine in y it to roll	SPECIAL A growing of padentes the	in the reave of Californ	
		the man programs	010.41	Tent to have nother dean	
				These is about graphically	
			Small Large	and a second sec	
		Home Users Bus	inesses Businesses Governme	End Users	



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r	1		
		At very top high speed backbone operated by MCI &at bottom end	
		users are present. There are intermediate layers of network access	
		providers (NAP) & Internet service providers (ISP).ISP is connected	
		to end user & it is responsible for passing call to NAP.	
	d)	Explain Leased Line with its benefits.	4M
	Ans.	Many medium and large organizations generally need a high	
		bandwidth for connecting to the Internet, because the number of users	
		is very high. For this, an ISP provides an option of leasing lines to	
		these kinds of organizations. A leased line can be thought of as a very	Explana
		thick pipe connecting the office of an organization with the internet	tion 2M
		via the ISP. A medium-to-big organization obtains a digital line from	
		an ISP for a fixed charge per month, regardless of its actual use. That	
		is organization may or may not use the complete bandwidth of the	
		leased line, but it would still pay a fixed charge. In return, the	
		organization gets larger bandwidth from the ISP, shared by multiple	
		users mostly through a LAN.	
		Benefits of leased line (Any TWO points):	
		1. It provides high speed/ band width dedicated internet line.	Anv 2
		2. It provides bandwidth on demand for a specified duration of time.	benefits
		3 More nodes can be added to the network without much	1M each
		modification.	
	e)	Describe DODB.	4M
	Ans.	Basics of DODB The Distributed Queue Dual Bus (DODB) protocol	
	1 111,50	is a dual bus configuration. This means that each host in the network	
		connects to two backbone network lines. The hosts get an access to	
		the transmission medium with an approach that is different from	Descrint
		LANs Distributed Queue Dual Rus (DODB) is a Data-link layer	ion 3M
		communication protocol for Metropolitan Area Networks (MANs)	1011 5111
		specified in the IEEE 802.6 standard and designed for use in MANs	
		specified in the HEED 002.0 standard and designed for use in third (s.	
		Direction of flow on bus A ———————————————————————————————————	Diagram
		- $($ $)($ $)($ $)($	1M
			£ 17£
		Head end	
		Bus B	
		- Direction of flow on bus B	



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	In case of DQDB, a mechanism called distributed queue is used and	
	hence the name Distributed queue Dual Bus (DQDB). Figure shows	
	sample DQDB architecture with two unidirectional buses, called bus	
	A and B. In the fig. hosts numbered 1 to N connect to these buses.	
	Each bus connects to the hosts on their and input and output ports.	
	Distributed Queue Dual Bus (DQDB) is an example of MAN. IT uses	
	the mechanism of a dual queue. There are two buses connecting all	
	the computers on a DQDB network. Each bus allows traffic in a	
	single direction only. To transmit data, the sending host must select	
	one of the two buses. A host reserves the slot before transmitting its	
	data. At any point of time, every host knows how many reservations	
	are pending to be served.	
f)	Explain VRC method of error detection with suitable example.	4M
Ans.	VRC:	
	• Vertical redundancy check (VRC), a parity bit is added to every	
	data unit so that the total number of 1's become even.	
	• A redundant bit is called as parity bit.	Explana
	• After appending redundant bit to data unit if total number of 1's in	tion 3M
	the packet (including parity bit) becomes even then it is called	
	even parity checking & if total number of 1's in the packet	
	(including parity bit) becomes odd then it is called odd parity	
	checking.	
	1. A parity bit is added to data packet for purpose of error detection.	
	2. Upon receipt of the packet, parity needed for data is recomputed	
	& compared to parity received with the data. If any bit has	
	changed state, parity will not match & error can be detected.	
	3. In fact, if an odd number of bits (not just one) have been altered,	
	parity will not match. If even numbers of bits have been reversed,	
	the parity will match even though error has occurred.	
	<i>Example:</i> Suppose sender wants to send 1110111 data unit to	
	receiver & both uses even parity checking.	
	Solution:	Example
	Original Data to send:	<i>1M</i>
	Both sender & receiver use Even parity checking. As total number of	



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		1's in data unit are even i.e. six the parity bit added to end of data unit	
		will be 0, so it maintains even parity of data unit.	
		Actual data send by sender:	
4		Attempt any four of the following:	16
т.	a)	Explain Packet Switching for datagram annroach	10 4M
	a) Ang	Datagram Packat Switching.	
	AII5.	Datagram Facket Switching.	
		Datagram packet-switching is a packet switching technology by	
		which each packet, now called a datagram, is treated as a separate	
		entity. Each packet is routed independently through the network.	E
		Therefore packets contain a header with the full information about the	Explana
		destination. The intermediate nodes examine the header of a packet	
		and select an appropriate link to another node which is nearer to the	
		destination. In this system, the packets do not follow a pre-established	
		route, and the intermediate nodes do not require prior knowledge of	
		the routes that will be used.	
		In datagram packet switching each packet is transmitted without any	
		regard to other packets. Every packet is treated as individual,	
		independent transmission.	
		Even if a packet is a part of multi packet transmission the network	
		treats it as though it existed along. Dealects in this approach are	
		alled determine Determine switching is done at the network layer	
		Caned datagrams. Datagram switching is done at the network layer.	
		Figure show now a datagram approach is used to deriver four packets	
		from station A to station D. All the four packets belong to same	
		destination is station D	



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	Compare WAN and MAN (any 4 points).				
	Sr. No.	Parameter	WAN	MAN	
	1	Ownership of Network	Private or Public	Private or Public	
	2	Area covered	Very large(states or countries)	Moderate (City)	Any 4
	3	Design and Maintenance	Not Easy	Not Easy	compari son 1M
	4	Communicatio n medium	PSTN or Satellite links	Coaxial cables, PSTN, Optical Fiber Cables, Wireless	each
	5	Data rates	Low	Moderate	
	6.	Mode of communicatio n	Each station cannot transmit	Each station can transmit or receive	
	7	Principle	Switching	Both	
	8	Propagation Delay	Long	Moderate	
d) Ans.	Expla Defini	tion: FTP (File T	orking.	a high-level (application	4NI
	layer) files. T to a re	protocol is an inte The user requests the mote server.	erface for any user on the FTP to either retri	f the internet to transfer eve from or upload a file	



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ARP Message Format	
0 8 16 24 31	
HW Type Protocol Type	
HW Len Protocol Len Operation	D:
Sender HW Address (6 bytes)	Diagram 2M
Sender IP Address Sender IP Address (4 bytes)	2111
Target HW Address	
Target IP Address (4 bytes)	
Hardware (HW) Type: 1 for Ethernet	
 Protocol Type: 0800₁₆ = IP address HW Len and Protocol Len allows arbitrary networks to be used Operation: 1 = ARP Request, 2 = ARP Response 3 = RARP Request, 4 = RARP Response ARP messages are sent directly to MAC layer ARP message is 28 octets long. 	
 Following are the fields in the Address Resolution Protocol (ARP) Message Format. Hardware Type: Hardware Type field in the Address Resolution Protocol (ARP) Message specifies the type of hardware used for the local network transmitting the Address Resolution Protocol (ARP) message. Ethernet is the common Hardware Type and he value for Ethernet is 1. The size of this field is 2 bytes. Protocol Type: Each protocol is assigned a number used in this field. IPv4 is 2048 (0x0800 in Hexa). Hardware Address Length: Hardware Address Length in the Address Resolution Protocol (ARP) Message is length in bytes of a hardware (MAC) address. Ethernet MAC addresses are 6 bytes 	Explana tion 2M
Protocol Address Length: Length in bytes of a logical address (IPv4 Address). IPv4 addresses are 4 bytes long.	



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	Operation/Opcode: Operation/Opcode field in the Address Resolution Protocol (ARP) Message specifies the nature of the ARP message. 1 for ARP request and 2 for ARP reply.		
	Sender Hardware Address: Layer 2 (MAC Address) address of the device sending the message.		
	Sender Protocol Address: The protocol address (IPv4 address) of the device sending the message		
	Target Hardware Address: Layer 2 (MAC Address) of the intended receiver. This field is ignored in requests.		
	Target Protocol Address: The protocol address (IPv4 Address) of the intended receiver.		
f)	Describe SLIP and PPP.	4M	
Ans.	SLIP : SLIP (Serial Line Internet Protocol)		
	The Serial Line Internet Protocol (also SLIP) is an encapsulation of		
	the Internet Protocol designed to work over serial ports and	~	
	modem connections.	SLIP	
	SLIP is a connection less protocol.	2M	
	SLIP does not perform error detection & correction.		
	SLIP supports only IP.		
	IP address is assigned statically.		
	SLIP does not provide any authentication.		
	protocols		
	PPP· PPP (Point-to-Point Protocol)		
	PPP is a connection-oriented protocol		
	PPP performs error detection & correction.	PPP 2M	
	PPP supports multiple protocols.		
	IP address is assigned dynamically.		
	PPP provides authentication.		
	PPP is approved Internet standard.		
	PPP is a collection of three protocols:		
	1. A datagram encapsulation protocol		
	2. LCP (Link control Protocol), enabling testing and		
	communication configuration.		



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		3. NCP (Network Control Protocols) allowing integration control	
F		of PPP within the protocols of the upper layers.	1(
э.	a)	Attempt any four of the following: Describe Cotowaya with its two advantages and two	10 4M
	a)	disadvantages and two	411/1
	Ang	Gataway is davide which operates on all layers of OSI model &	
	Ans.	TCP/IP Gateway is protocol converter. Gateway enables communication between different network architecture and environments. Gateway connects two systems that do not use the same protocol, data format, language and architecture. Convert commonly used protocols (e.g. TCP/IP) to a specialized protocol (for example, an SNA: System Network Architecture). Convert message formats from one format to another. Translate different addressing schemes.	Descript ion 2M
		Advantages of Gateways:	
		1. Used to expand the network.	
		2. Gateway is a server so it provides some security.	Any two
		3. We can connect two different types of networks.	advanta
		4. Protocol conversion is done.	ges IM
		5. Effectively nancies the traffic problems.	eacn
		Disadvantages of Gateway.	
		1. Not an intelligent device. So noise prevention is not done.	Anv two
		2. Never filter out the data.	disadvan
		3. Somewhat costly	tages
		4. Protocol conversion is done so transmission rate is slower.	1M each
		5. Somewhat hard to handle.	
	b)	Explain Data Fragmentation and Reassembly.	4 M
	Ans.	Data Fragmentation: For transferring data over network each	
		transfer protocol applies upper limit to size of data in PDU (packet).	Data
		If size of datagram is larger than MTU then it is divided into small	Fragme
		units of size supported called fragment & this activity of dividing	ntation
		datagram into small unit is called as fragmentation	2M
		Reassembly: When a datagram is fragmented, either by the originating device or by one or more routers transmitting the datagram, it becomes multiple fragment datagrams. The destination of the overall message must collect these fragments and then reassemble them into the original message. Reassembly is	Reassem bly 2M



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	accomplished by using the special information in the fields we saw in	
	the preceding topic to help us "put the jigsaw puzzle back together	
	again".	
c)	Explain layers of OSI model (any 2 layers).	4 M
Ans.	OSI model has following 7 layers as Physical layer, data link layer,	
	Network layer, Transport layer, Session layer, Presentation layer,	
	Application layer. Following are the functions performed by the	
	above layer.	
	1. Physical layer: it deals with the mechanical and electrical	
	specification of the interface and transmission medium.	
	a. Physical characteristics of interfaces and medium.	
	b. Representation of bits or signals.	Explana
	c. Data rate	tion of
	d. Synchronization of bit	any 2
	e. Line configuration or connection type.	layers
	f. Physical topology	2M each
	g. Transmission mode.	
	2. Data link layer: It performs node to node delivery of the data It	
	is responsible for transmitting group of bits between the adjacent	
	nodes. The group of bits is called as frame.	
	a. Framing	
	b. Physical addressing	
	c. Flow control	
	d. Error control	
	e. Media access control	
	f. Node to node delivery	
	3. Network layer: It is responsible for routing the packets within	
	the subnet i.e. from source to destination. It is responsible for	
	source to destination delivery of individual packets across	
	multiple networks. It ensures that packet is delivered from point	
	of origin to destination.	
	a. Logical addressing	
	b. Routing	
	c. Congestion control	
	d. Accounting and billing	
	e. Fragmentation	
	f. Source host to destination host error free delivery of	



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	packet.	
	 4. Transport layer: Responsibility of process to process delivery of message Ensure that whole message arrives in order. a. Service point addressing b. Segmentation and reassembly c. Connection control d. Flow control: Flow control is performed end to end e. Error control 	
	 5. Session layer: Establishes, maintains, and synchronizes the interaction among communication systems. It is responsible for dialog control and synchronization. a. Dialog control b. Synchronization c. Token Management d. Activity Management e. Data Exchange 	
	 6. Presentation layer: It is concerned with syntax, semantics of information exchanged between the two systems. a. Translation: presentation layer is responsible for converting various formats into required format of the recipient b. Encryption: Data encryption and decryption is done by presentation layer for security. c. Compression and Decompression: data to be transform compressed while sending and decompress while receiving for reducing time of transmission. 	
	 7. Application layer: It enables user to access the network. It provides user interfaces and support for services like email, remote file access. a. Network virtual terminal. b. File transfer access and management. 	
	c. Mail services	
 d)	Describe CRC with example	4M
u) Ans	Cyclic Redundancy Check (CRC). An error detection mechanism	-111
A113.	in which a special number is appended to a block of data in order to	
	in which a special number is appended to a block of data in older to	



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e)	Explain different types of transmission errors.	4 M
Ans. There are two types of transmission errors:		
	1. Single bit errors	
	2. Burst errors	
	Single bit errors: If the signal is carrying binary data, and if a value of 0 to changes to 1 or vice versa then it is known as single bit error. Single bit errors are more likely in the case of parallel transmission because it is likely that one of the eight wires carrying the bits has become noisy, resulting incorruption of a single bit of each byte. This can be a case of parallel transmission between the CPU and the memory inside a computer.	Types of transmis sion errors 2M each
	Burst errors: In burst error multiple bits of binary value are changed. In contrast, a burst changes at least two bits during data transmission because of errors. Note that burst errors can change any two or more bits in a transmission. These bits need not necessarily be adjacent bits. Burst errors are more likely in serial transmission, because the duration of noise is longer, which causes multiple bits to be corrupted.	
f)	State the meanings of:	4 M
	i) Phase ii) Frequency	
	iii) Bandwidth iv) Time Period	
Ans.	i) Phase: It describes position of waveform with respect time $(t=0)$.	
	In electronic signaling, phase is a definition of the position of a point in time (instant) on a waveform evaluation	1M oach
	point in time (instant) on a waveform cycle.	for
	ii) Frequency: Frequency is the rate of change with respect to time.OR	correct meaning
	Frequency is also defined as the number of cycles per second, which is the inverse of Period.	
	iii) Bandwidth: The information carrying capacity of a signal or a medium, calculated using the difference between the highest and the lowest frequency. A range of frequencies within a given band, in particular that used for transmitting a signal. Bandwidth (signal processing) or analog bandwidth, frequency bandwidth or radio bandwidth: a measure of the width of a range of frequencies, measured in hertz.	



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		iv) Time Period: A Time period (T) is the time needed for one		
		complete cycle of vibration to pass a given point. As the frequency of		
		a wave increases, the time period of the wave decreases. Frequency		
		and time Period are in a reciprocal relationship that can be expressed		
		mathematically as: $T = 1/f$ or as: $f = 1/T$.		
6.		Attempt any four of the following:		
	a)	Compare between OSI and TCP/IP model (any 4 points).		
	Ans.	OSI (Open System TCP/IP (Transmission		
		Interconnection)	Control Protocol / Internet	
			Protocol)	
		1 OSL is a generic protocol	1 TCP/IP model is based on	
		independent standard acting as	standard protocols around which	
		a communication gateway	the Internet has developed. It is	Anv 4
		between the network and end	a communication protocol	noints
		user	which allows connection of	1M each
			hosts over a network	1112 00010
		2 In OSI model the transport	2 In TCP/IP model the	
		laver guarantees the delivery of	transport layer does not	
		nackets	guarantees delivery of packets	
		3 OSI model has a separate	3 TCP/IP does not have a	
		Presentation layer and Session	separate Presentation layer or	
		laver	Session laver	
		5 OSL is a reference model	5 TCP/IP model is in an actual	
		around which the networks are	implementation of protocols	
		built Generally it is used as a	which we use on day to day	
		guidance tool	hasis	
			04313.	
		6 Network layer of OSI model	6 The Network layer in TCD/ID	
		provides both connection	model provides connectionless	
		provides both connection	sorvice	
		sorvice	service.	
		7 OSI model has a problem of	7 TCP/IP model has its own set	
		fitting the protocols into the	7. TCF/IF model has its own set	
		model	of protocols for each layer.	
		Protocols are hidden in OSI	8 In TCD/ID protocols are well	
		model and are casily replaced as	o. III TCF/IF protocols are well known and not assy to replace	
		the technology changes	known and not easy to replace.	
		0 OSL model defines convices	0 In TCD/ID convices	
		9. USI model defines services,	9. In ICP/IP, services,	
		interfaces and protocols very	interfaces and protocols are not	



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	clearly and makes clearclearly separated. It is alsodistinction between them. It is protocol independent.protocol dependent.10. It has 7 layers10. It has 4 layers		
b)	Describe the following:	4M	
Ans.	 1) Bridge: Bridge is a device used to connect two or more LAN segments together. Bridge operates at the data link layer of OSI model. A Bridge provides packet filtering at data link layer, meaning that it only passes the packets that are destined for the other side of the network. Types of Bridges: Following types of Bridges are used in network: 1) Transparent Bridge. 2) Translational Bridge. 3) Source route Bridge. 		
	2) Repeater: Repeater operates at the physical layer. Its job is to regenerate the signal over the same network before the signal becomes too weak or corrupted so as to extend the length to which the signal can be transmitted over the same network. An important point to be noted about repeaters is that they do no amplify the signal. When the signal becomes weak, they copy the signal bit by bit and		
c) Ans.	Describe internal architecture of ISP.	4M Diagram 2M	
	Figure: ISP		



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	A subscriber of an ISP connects to one of the telephone lines of the ISP via modem. ISP is equipment. The ISP''s modem routes the subscriber to the remote access server (RAS) to authenticate the subscriber. Once the user is authenticated, the subscriber is as good as connected to the internet. Once the user is connected to the internet, the user can requests web pages send/receive emails or files, so on. The user interaction with the internet is coordinated by the RAS (remote Access Server), the ISP allows the user to create an email ID and use it for sending/receiving emails. The main point is that since the internet users are not always connected to the internet, an ISP stores emails on their behalf on the SMTP server temporarily. Web server performs two operations. i. It can be used by the ISP to setup a portal ii. This web can be used to store the web pages created by the subscribers. These web pages belongs to the ISP's portal, can be hosted by different web servers for security and maintenance.		
d)	Compare Analog signal and Digital signal. (4 points).		
Ans.	Analog Signal	Digital Signal	
	An analog signal has infinitely	A digital signal has only a	
	many levels of intensity over a	limited number of values along	
	period of time	its value	
	As the wave moves from value	Although each value can be any	
	A to value B. it passes through	number, it is often as simple as	Any 4
	and includes an infinite number 1 and 0		
	of values along its path		1M each
	Analog signals are continuous	Digital signals are discrete in	
	in nature	nature	
	Analog signals are higher	Digital signals are lower density	
	density		
	Loss and Distortion is high	Loss and Distortion is low	
	Analog signals are less secure	Digital signals are more secure	
	Less bandwidth is require for	High bandwidth is requiring for	
	transmission	transmission	
	Synchronization not present	Synchronization present	
	Examples: Human voice in air,	Examples: Computers and	
	signals in analog electronic	digital electronic devices	
	devices		
	Analog signal is best suited for	Digital signal is best suited for	



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	audio and video transmission.	computing and	digital	
		electronics		
e)	What is WAN Addressing? Give its use.			4M
Ans.	WAN Addressing: WAN addressing is hierarchical addressing			
	system. The address of a host on WAN is composed of two parts as			
	1 Switch no:-It identifies switch to	which host is connected		WAN
	2 Host no :- It identifies Host which is attached to that switch			addressi
	Overall address is made up of cor	nbination of switch no.	& host no.	ng 2M
	as shown in following figure:			0
	Switch number = 1			
	So, address = $[1, 1]$	Switch nu	mber = 2	
		So, addres	ss = [2, 2]	
		5 - D		
	Packet switch 1	Packet switch 2		
		E E		
		5-0		
		Switch nu	mber = 2	
	Switch number = 1 Host number = 6	Host num	ber = 6	
	So, address = [1, 6]	So, addres	s = [2, 6]	
	In given Example hosts are connected to WAN switches 1,2 The host			
	In this example will be identified bits switch ID & its own ID relevant to that switch that means different host on different switch can have			
	same Host id like host(2.1) & host (3.1) having same host id			
	same rost to like lost(2,1) enost (3,1) having same host to.			
	Use of WAN addressing: A WAN address is the IP address that			
	router uses to connect to the Internet. It is different from IP addresses			
	of computers and devices on a local network, because the WAN IP is			U
	essentially shared by all the devices. WAN IPs is commonly used for			USE ZM
	server connections, because the address can be used to connect to			
f)	What is Multiploving? List types of multiploving and ownlain any		4M	
1)	one		-#1AT	
Ans.	Multiplexing: Multiplexing divides the physical line or a medium			
	into logical segments called channels. In multiplexing, different		Multiple	
	channels carry data simultaneousl	y over the same physical	l medium.	xing 2M



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Hardware equipment called multiplexer (or mux in short) combines (or multiplexes) the inputs from different sources, and loads them on different channels of a medium. The combined data traverses over the medium simultaneously. At the destination, a demultiplexer (also called demux) separates (or demultiplexes) the signals meant for different destinations. The demultiplexer sends these separated signals appropriately to the different destinations. This is depicted in	
 Fights appropriately to the different destinations. This is depicted in fig. This is cheaper than having three separate lines. Types of Multiplexing: There are basically two ways in which multiplexing and demultiplexing can be achieved. They are Frequency Division Multiplexing (FDM), Wave Division Multiplexing (WDM) and Time Division Multiplexing (TDM). 	Types 1M
 Frequency Division Multiplexing (FDM): FDM divides the channel into multiple, but smaller frequency ranges to accommodate more users. FDM is an analog technology. FDM divides the spectrum or carrier bandwidth in logical channels and allocates one user to each channel. Each user can use the channel frequency independently and has exclusive access of it. All channels are divided in such a way that they do not overlap with each other. Wave Division Multiplexing: It is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths (i.e., colors) of laser light. This technique enables bidirectional communications over one strand of fiber, as well as multiplication of capacity. 	Explana tion of any one 1M
2. Time Division Multiplexing (TDM): TDM divides a channel by allocating a time period for each channel. TDM is applied primarily on digital signals but can be applied on analog signals as well. In TDM the shared channel is divided among its user by means of time slot. Each user can transmit data within the provided time slot only. Digital signals are divided in frames, equivalent to time slot i.e. frame of an optimal size which can be transmitted in given time slot.TDM works in synchronized mode. Both ends, i.e. Multiplexer and Demultiplexer are timely synchronized and both switch to next channel simultaneously.	