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| D:\VK\GIET LOGO.jpg | **GIET UNIVERSITY, GUNUPUR – 765022**  B. Tech (Fourth Semester – Regular) Examinations, April / May – 2021  **Sub. Code – Computer Networks**  **(Branch or Common to -------------)** |
| Time: 3 hrs Maximum: 70 Marks | |

**Answer ALL Questions**

**The figures in the right hand margin indicate marks.**

**PART – A: (Multiple Choice Questions) (1 x 10=10 Marks)**

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| Q.1. Answer ***ALL*** questions | | | [CO#] | [PO#] |
| a. | A subset of a network that includes all the routers but contains no loops is called \_\_\_\_\_\_\_\_ | | CO1 | 1 |
|  | (i) **spanning tree** | (ii) spider structure |  |  |
|  | (iii) special tree | (iv) spider tree |  |  |
| b. | Which of the following devices modulates digital signals into analog signals that can be sent over traditional telephone lines? | | CO1 | 1 |
|  | (i) Router | (ii) Gateway |  |  |
|  | (iii) Switch | (iv) **Modem** |  |  |
| c. | Bits can be sent over guided and unguided media as analog signal by \_\_\_\_\_\_\_\_\_\_\_ | | CO2 | 1 |
|  | (i) **amplitude modulation** | (ii) digital modulation |  |  |
|  | (iii) frequency modulation | (iv) phase modulation |  |  |
| d. | The data link layer takes the packets from \_\_\_\_\_\_\_\_\_ and encapsulates them into frames for transmission. | | CO2 | `1 |
|  | (i) transport layer | (ii) physical layer |  |  |
|  | (iii) **network layer** | (iv) application layer |  |  |
| e. | Which provision can resolve / overcome the shortcomings associated with duplication or failure condition of Stop and Wait Automatic Repeat Request protocol especially due to loss of data frames or non-reception of acknowledgement? | | CO2 | 2 |
|  | (i) **Provision of sequence number in the header of message** | (ii) Provision of checksum computation |  |  |
|  | (iii) Stop and Wait Automatic | (iv) Duplication or failure condition |  |  |
| f. | When a router cannot route a datagram or host cannot deliver a datagram, the datagram is discarded and the router or the host sends a \_\_\_\_\_\_\_\_\_\_\_\_ message back to the source host that initiated the datagram. | | CO2 | 2 |
|  | (i) Source quench | (ii) Router error |  |  |
|  | (iii) **Destination unreachable** | (iv) Time exceeded |  |  |
| g. | What are called routers? | | CO3 | 2 |
|  | (i) The devices that operates at session layer | (ii) The devices that operates at data layer |  |  |
|  | (iii) The devices that operates at application layer | (iv) **The devices that operates at network** |  |  |
| h. | Which one of the following descriptions about IPv6 is correct? | | CO3 | 2 |
|  | (i) Addresses are not hierarchical and are assigned at random | (ii) **Broadcasts have been eliminated and replaced with multicasts** |  |  |
|  | (iii) There are 2.7 billion available addresses | (iv) An interface can only be configured with one IPv6 address |  |  |
| i. | Transport layer aggregates data from different applications into a single stream before passing it to \_\_\_\_\_\_\_\_\_\_\_\_ | | CO4 | 1 |
|  | (i) **network layer** | (ii) data link layer |  |  |
|  | (iii) application layer | (iv) physical layer |  |  |
| j. | Which one of the following is a version of UDP with congestion control? | | CO4 | 1 |
|  | (i) stream control transmission protocol | (ii) **datagram congestion control protocol** |  |  |
|  | (iii) structured stream transport | (iv) user congestion control protocol |  |  |

**PART – B: (Short Answer Questions) (2 x 10=20 Marks)**

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| Q.2. Answer ***ALL*** questions | | [CO#] | [PO#] |
| a. | What is the purpose of Dialog Controller?  **A Dialog Controller (DC) is an element that composes the Language Comprehension module and provides a way of establishing a dialog between two agents. A DC can be prepared to answer questions or start a new conversation spontaneously.** | CO1 | 1 |
| b. | List out the advantages of star Topology.   * **\*Easy to install and wire.** * **\*No disruptions to the network when connecting or removing devices.** * **\*Requires more cable length than a linear bus topology.** * **\*If the connecting network device (network switch) fails, nodes attached are disabled and cannot participate in computer network communication**. | CO1 | 2 |
| c. | Infer the Role of the L2CAP layer in Bluetooth?  **The Bluetooth L2CAP or logical link control and adaptation protocol is used to provide an interface for all the data applications that use the ACL links. The Bluetooth L2CAP provides multiplexing between the higher layer protocols. This enables multiple applications to utilise the same lower layer links.** | CO2 | 2 |
| d. | Examine the access method used by wireless LAN?  **IEEE 802.11 wireless LANs use a media access control protocol called Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). While the name is similar to Ethernet's Carrier Sense Multiple Access with Collision Detection (CSMA/CD), the operating concept is totally different.** | CO2 | 3 |
| e. | Analyze how Routers differentiate the incoming unicast, multicast and broadcast IP Packets.  **Unicast: from one source to one destination i.e. One-to-One. ... Broadcast: from one source to all possible destinations i.e. One-to-All. Multicast: from one source to multiple destinations stating an interest in receiving the traffic** | CO3 | 1 |
| f. | Identify all the metrics used by Routing Protocols?  **Router metrics can contain any number of values that help the router determine the best route among multiple routes to a destination. A router metric typically based on information like path length, bandwidth, load, hop count, path cost, delay, MTU, reliability and communications cost** | CO3 | 3 |
| g. | List the Flag used in TCP Header.   * **1st Flag - Urgent Pointer. The first flag is the Urgent Pointer flag, as shown in the previous screen shot. ...** * **2nd Flag - ACKnowledgement. The ACKnowledgement flag is used to acknowledge the successful receipt of packets. ...** * **3rd Flag - PUSH. ...** * **4th Flag - Reset (RST) Flag. ...** * **5th Flag - SYNchronisation Flag. ...** * **6th Flag - FIN Flag. ...** | CO4 | 1 |
| h. | Identify how a well-known port different from an ephemeral port?  **what this means is that there's really no technical difference between a "well-known" port, or a "registered port", or a "dynamic"/"ephemeral" port. ... In fact, IANA's page even provides different names for these categories: "System" ports (for 0-1023), User ports (for 1024-49151), and Private ports (for 49152-65535)** | CO4 | 2 |
| i. | How does UDP address flow control mechanism?  **UDP-based real-time applications must be "self-regulating." RTP can rely on RTCP (Real-time Control Protocol) to control transmission rates when packets are dropped. RTCP is a feedback mechanism that helps real-time applications work within the available bandwidth of the network.** | CO4 | 1 |
| j. | What is the purpose of TCP Push operation?  **A push function is defined. To assure that data submitted to a TCP is actually transmitted the sending user indicates that it should be pushed through to the receiving user. A push causes the TCPs to promptly forward and deliver data up to that point to the receiver.** | CO4 | 2 |

**PART – C: (Long Answer Questions) (10 x 4=40 Marks)**

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| Answer ***ALL*** questions | | Marks | [CO#] | [PO#] |
| 3. a. | **Explain Fiber optic communication in detail?**  **Fiber-optic communication is a method of transmitting information from one place to another by sending pulses of infrared light through an optical fiber. ... This type of communication can transmit voice, video, and telemetry through local area networks or across long distances.** [**Optical fiber**](https://en.wikipedia.org/wiki/Optical_fiber)**is used by telecommunications companies to transmit telephone signals, Internet communication and cable television signals. It is also used in other industries, including medical, defence, government, industrial and commercial. In addition to serving the purposes of telecommunications, it is used as light guides, for imaging tools, lasers, hydrophones for seismic waves, SONAR, and as sensors to measure pressure and temperature.** | 4 | CO1 | 1 |
| b. | **Draw the OSI network architecture and explain the Functionalities of every layer in detail.**  **Diagram**  Layers of OSI Model Explained  **Both the end user and the application layer interact with the software applications. An upper layer refers to the layer just above another layer. The lower layer of the OSI model deals with the data transport issues. The data link layer and the physical layer are implemented in hardware and software.** | 6 | CO1 | 2 |
|  | **(OR)** |  |  |  |
| c. | **Explain in detail about TCP/IP Protocol suite with neat diagram?**  **Diagram**  The TCP/IP Model and Protocol Suite Explained for Beginners  **Communications between computers on a network is done through protocol suits. The most widely used and most widely available protocol suite is TCP/IP protocol suite. A protocol suit consists of a layered architecture where each layer depicts some functionality which can be carried out by a protocol. Each layer usually has more than one protocol options to carry out the responsibility that the layer adheres to. TCP/IP is normally considered to be a 4 layer system. The 4 layers are as follows :**   1. **Application layer** 2. **Transport layer** 3. **Network layer** 4. **Data link layer** | 5 | CO1 | 1 |
| d. | **Analyze the advantage of optical fiber over twisted pair and coaxial cable.**  **1.Greater Bandwidth**  **2. Faster Speeds**  **3. Longer Distances**  **4. Better Reliability**  **5. Thinner and Sturdier**  **6. More Flexibility for the Future**  **7. Lower Total Cost of Ownership** | 5 | CO1 | 3 |
|  |  |  |  |  |
| 4. a. | Assess and explain the Ethernet Frame Format.  **Basic frame format which is required for all MAC implementation is defined in IEEE 802.3 standard. ... Ethernet header contains both Source and Destination MAC address, after which the payload of the frame is present. The last field is CRC which is used to detect the error**.  Ethernet Frame Format - GeeksforGeeks | 6 | CO2 | 2 |
| b. | Examine the various issues in the Data link layer.   * **Providing services to the network layer.** * **Framing.** * **Error Control.** * **Flow Control.** | 4 | CO2 | 1 |
|  | (OR) |  |  |  |
| c. | Discuss the different ways to address the framing problem.  **Bits flow between adaptors, frames between hosts. There are several ways to address the framing problem. ... Note that while we discuss framing in the context of point-to-point links, the problem is a fundamental one that must also be addressed in multiple-access networks like Ethernet and Wi-Fi.** | 5 | CO2 | 3 |
| d. | Analyze the Architecture of IEEE 802.11  **The architecture of the IEEE 802.11 WLAN is designed to support a network where most decision making is distributed to mobile stations. This type of architecture has several advantages. It is tolerant of faults in all of the WLAN equipment and eliminates possible bottlenecks a centralized architecture would introduce. The architecture is flexible and can easily support both small, transient networks and large, semi permanent or permanent networks. In addition, the architecture and protocols offer significant power saving and prolong the battery life of mobile equipment without losing network connectivity**  enter image description here | 5 | CO2 | 2 |
|  |  |  |  |  |
| 5. a. | Explain in detail the operation of OSPF protocol by considering a suitable network.  **Open Shortest Path First (OSPF) is a routing protocol for Internet Protocol (IP) networks. It uses a link state routing (LSR) algorithm and falls into the group of interior gateway protocols (IGPs), operating within a single autonomous system (AS). ... OSPF is a widely used IGP in large enterprise networks.**  Open shortest path first (OSPF) router roles and configuration -  GeeksforGeeks | 7 | CO3 | 1 |
| b. | Discuss in detail the various aspects of IPV6.   * **Expanded Addressing. IP address size increases from 32 bits in IPv4 to 128 bits in IPv6, to support more levels of addressing hierarchy.** * **Address Autoconfiguration and Neighbor Discovery.** * **Header Format Simplification.** * **Improved Support for IP Header Options.** * **Application Support for IPv6 Addressing.** * **Additional IPv6 Resources.** | 3 | CO3 | 2 |
|  | (OR) |  |  |  |
| c. | Examine the function of the Border Gateway Protocol used for Inter domain routing in internetwork.  [**Border Gateway Protocol (BGP)**](https://practice.geeksforgeeks.org/problems/bgpborder-gateway-protocol)**is used to Exchange routing information for the internet and is the protocol used between ISP which is different ASes.**  **The protocol can connect together any internetwork of autonomous system using an arbitrary topology. The only requirement is that each AS have at least one router that is able to run BGP and that is router connect to at least one other AS’s BGP router. BGP’s main function is to exchange network reach-ability information with other BGP systems. Border Gateway Protocol constructs an autonomous systems’ graph based on the information exchanged between BGP routers.**  **Characteristics of Border Gateway Protocol (BGP):**   * **Inter-Autonomous System Configuration: The main role of BGP is to provide communication between two autonomous systems.** * **BGP supports Next-Hop Paradigm.** * **Coordination among multiple BGP speakers within the AS (Autonomous System).** * **Path Information: BGP advertisement also includes path information, along with the reachable destination and next destination pair.** * **Policy Support: BGP can implement policies that can be configured by the administrator. For ex:- a router running BGP can be configured to distinguish between the routes that are known within the AS and that which are known from outside the AS.** * **Runs Over TCP.** * **BGP conserve network Bandwidth.** * **BGP supports CIDR.** * **BGP also supports Security.** | 6 | CO3 | 3 |
| d. | Explain the working of Distance vector routing protocol in detail.  **A distance-vector routing (DVR) protocol requires that a router inform its neighbours of topology changes periodically. ... Bellman Ford Basics – Each router maintains a Distance Vector table containing the distance between itself and ALL possible destination nodes.** | 4 | CO3 | 1 |
|  |  |  |  |  |
| 6. a. | Draw and explain TCP state Transition diagram for Connection management. 18.6 TCP State Transition Diagram | TCP/IP Illustrated, Vol. 1: The  Protocols (Addison-Wesley Professional Computing Series)  **The TIME\_WAIT state is also called the 2MSL wait state. Every implementation must choose a value for the *maximum segment lifetime*(MSL). It is the maximum amount of time any segment can exist in the network before being discarded. We know this time limit is bounded, since TCP segments are transmitted as IP datagrams, and the IP datagram has the TTL field that limits its lifetime.**  **RFC 793 [Postel 1981c] specifies the MSL as 2 minutes. Common implementation values, however, are 30 seconds, 1 minute, or 2 minutes.**  **Recall from Chapter 8 that the real-world limit on the lifetime of the IP datagram is based on the number of hops, not a timer.**  **Given the MSL value for an implementation, the rule is: when TCP performs an active close, and sends the final ACK, that connection must stay in the TIME\_WAIT state for twice the MSL. This lets TCP resend the final ACK in case this ACK is lost (in which case the other end will time out and retransmit its final FIN).** | 7 | CO4 | 1 |
| b. | Organize three ways of connection termination in TCP using state transition diagram.   * **Step 1 (FIN From Client) – Suppose that the client application decides it wants to close the connection.** * **Step 2 (ACK From Server) –** * **Step 3 (Client waiting) –** * **Step 4 (FIN from Server) –** * **Step 5 (ACK from Client) –** * TCP Connection Termination - GeeksforGeeks | 3 | CO4 | 2 |
|  | (OR) |  |  |  |
| c. | Sketch a neat architecture and explain TCP in detail  **TCP/IP means Transmission Control Protocol and Internet Protocol. It is the network model used in the current Internet architecture as well. ... These protocols describe the movement of data between the source and destination or the internet. They also offer simple naming and addressing schemes**  Introduction to TCP/IP Reference Model | Studytonight | 5 | CO4 | 2 |
| d. | Describe in detail about Reliable Flooding.  **Flooding: A packet arriving through one network interface of a router is forwarded to routers connected to all other interfaces. Sequence number keeps the flooding in check. Every router will flood a packet indicating the same source and sequence number only once.**  **For example, assume that 4 bit sequence numbers are used to indicate values 0 to 15. Assume a scenario where a router receives a packet from a source S indicating a sequence number 5. Also assume that it had previously flooded a packet from S with sequence number 14. Now the router has to be able to distinguish unambiguously if the packet with sequence number 5 is fresher than the previously forwarded packet with sequence number 14.** | 5 | CO4 | 1 |

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