UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

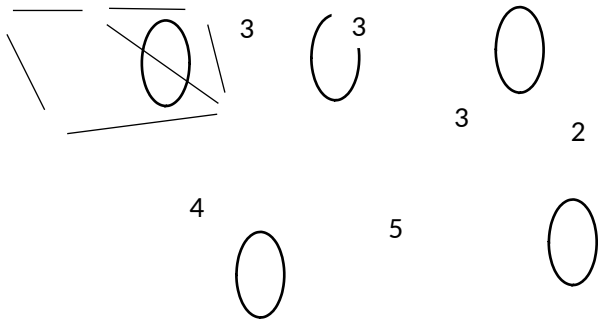
Course: Computer Networks **Semester: VI**
Program: B. Tech. /ICE
Time: 03 hrs. **Max. Marks: 100**

Instructions: Attempt all the questions

SECTION A

S. No.		Marks	CO
Q 1	Objective questions (a) _____ layer is responsible for the delivery of individual packets from the source host to the destination host. (i) Data link (ii) Network (iii) Transport (iv) Session (b) The technique in which a congested node stops receiving data from the immediate upstream node or nodes is called as (i) Admission policy (ii) Backpressure (iii) Forward signaling (iv) Backward signaling (c) The _____ translates internet domain and host names to IP address. (i) domain name system (ii) routing information protocol (iii) network time protocol (iv) internet relay chat (d) Which of the following requires that all channels in a message transmission path be of the same speed? (i) Packet switched networks (ii) Circuit switched networks (iii) Message switched networks (iv) None of these	**4**	**CO1**
Q2	Differentiate star topology and bus topology. Draw a hybrid topology with a star backbone and four bus networks.	**4**	**CO1**
Q3	Explain the following traffic profiles with suitable diagrams (a) Constant bit rate (b) Variable bit rate (c) Bursty bit rate	**4**	**CO2**
Q4	Explain the operation of following protocols in noiseless channel with suitable diagram. (a) Simplest protocol (b) Stop & wait protocol	**4**	**CO2**

<table>
<tr><td>Q5</td><td>An organization is granted the block 211.17.180.0/24. The administrator wants to create 32 subnets.
(a) Find the subnet mask
(b) Find the number of addresses in each subnet
(c) Find the first and last addresses in subnet 1
(d) Find the first and last address in subnet 32</td><td>4</td><td>CO3</td></tr>
<tr><td colspan="4">SECTION B</td></tr>
<tr><td>Q6</td><td>What do you understand by congestion in the network? Differentiate open loop and closed loop congestion control techniques. Briefly explain all the techniques in each category.</td><td>8</td><td>CO2</td></tr>
<tr><td>Q7</td><td>What do you understand by bit-stuffing? Consider the frame shown in the figure. Recreate the frame using Bit-stuffing and write the frame along with header and trailer, that are sent and received across two nodes.
000111111100111110100O</td><td>8</td><td>CO2</td></tr>
<tr><td>Q8</td><td>Explain the message format of ICMP. Briefly explain different types of error reporting and Query messages handled by ICMP.</td><td>8</td><td>CO3</td></tr>
<tr><td>Q9</td><td>Why switching is required in a network? Draw a switched network. Table 1 shows different types of switching networks and the addressing mechanism in each of them.
Table 1
<table><tr><th>Network</th><th>Setup</th><th>Data Transfer</th><th>Teardown</th></tr><tr><td>Circuit-switched</td><td>End-to-end</td><td>----------</td><td>End-to-end</td></tr><tr><td>Datagram</td><td>----------</td><td>End-to-end</td><td>----------</td></tr><tr><td>Virtual-circuit</td><td>End-to-end</td><td>Local</td><td>End-to-end</td></tr></table>Answer the following questions
a. Why does a circuit-switched network need end-to-end addressing during the setup and teardown phases? Why are no addresses needed during the data transfer phase for this type of network?
b. Why does a datagram network need only end-to-end addressing during the data transfer phase, but no addressing during the setup and teardown phases?
c. Why does a virtual-circuit network need addresses during all three phases?</td><td>8</td><td>CO1</td></tr>
<tr><td>Q10</td><td>Why do we need a DNS system when we can directly use an IP address? If a DNS domain name is challenger. voyager.fhda.edu, how many labels are involved here? How many levels of hierarchy? Briefly differentiate recursive resolution and iterative resolution with suitable diagrams.
OR
What is a proxy server and how it is related to HTTP? Briefly explain different header categories in HTTP.</td><td>8</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION-C</td></tr>
</table>

Q11	(a) Design a bidirectional algorithm for selective repeat automatic Repeat Request (ARQ) protocol using following specifications: (i) window size is 3 (ii) piggybacking. Note that both the parties need to use the same algorithm. (b) Design the routing table for router R1, using the configuration in figure 2.  Figure 2 (i) Show the forwarding process if a packet arrives at R1 in figure 2 with the destination address 180.70.65.140. (ii) Show the forwarding process if a packet arrives at R1 in figure 2 with the destination address 201.4.22.35. (iii) Show the forwarding process if a packet arrives at R1 in figure 2 with the destination address 18.24.32.78.	**20**	**CO2, CO3**
Q12	Design the routing table for each node in figure 3 using (i) Distance vector routing (ii) Link state routing  Figure 3	**20**	**CO3**

Name: **Enrolment No:**	UPES

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SECTION A

S. No.		Marks	CO
Q 1	Objective questions (a) Which one of the following task is not done by data link layer? (i) Framing (ii) Error control (iii) Flow control (iv) Channel coding (b) In open-loop control, policies are applied to _____ (i) Remove after congestion occurs (ii) Remove after sometime (iii) Prevent before congestion occurs (iv) Prevent before sending packets (b) When displaying a web page, the application layer uses the (i) HTTP protocol (ii) FTP protocol (iii) SMTP protocol (iv) none of the mentioned (c) Application layer protocol defines (i) Types of messages exchanged (ii) Message format, syntax and semantics (iii) Rules for when and how processes send and respond to messages (iv) All of the above	**4**	**CO1**
Q2	(a) Find the Class, Network id and Host id for the following IP address. (i) 15.3.2.3 (ii) 192.7.131.2 (b) Find the masks for the following IP address (i) 255.255.224.0 (ii) 255.255.240.0	**4**	**CO3**
Q3	For each of the following four networks, discuss the consequences if a connection fails. (a) Six devices arranged in a bus topology (b) Four devices arranged in a ring topology (c) Five devices arranged in a mesh topology (d) (d) Seven devices arranged in a star topology	**4**	**CO1**
Q4	Explain the following terms with respect to ICMP. (a) Source Quench (b) Redirection	**4**	**CO3**
Q5	Explain the following terms with respect to congestion.	**4**	**CO2**

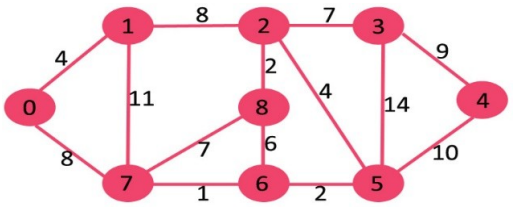
<table>
<tr><td></td><td>(a) Implicit Signaling
(b) Explicit Signaling</td><td></td><td></td></tr>
<tr><td colspan="4">SECTION B</td></tr>
<tr><td>Q6</td><td>How TCP is different from UDP protocol. Discuss the operation of UDP. Differentiate user datagram format and TCP segment format.</td><td>8</td><td>CO2</td></tr>
<tr><td>Q7</td><td>What do you understand by address mapping? In which situation ARP and RARP are required. A host with IP address 123.45.21.12 and Ethernet physical address 23:45:BA:00:67:CD has a packet to send to another host with IP address 130.23.43.25 and physical address A4:6E:F4:59:83:AB. The two hosts are on the same Ethernet network. Show the ARP request and reply packets encapsulated in Ethernet frames.</td><td>8</td><td>CO3</td></tr>
<tr><td>Q8</td><td>Compare and contrast a circuit-switched network and a packet switched network. Briefly explain all the three phases of circuit switched network with suitable diagrams.</td><td>8</td><td>CO1</td></tr>
<tr><td>Q9</td><td>What do you understand by quality of service in data communication? Discuss two scheduling and two traffic shaping techniques to improve the quality of service.</td><td>8</td><td>CO1</td></tr>
<tr><td>Q10</td><td>Describe the architecture of WWW. Discuss the three different types of web documents.
OR
Explain the domain name space. Differentiate the Generic domain and Country domain. Briefly discuss the frame format of DNS message</td><td>8</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION-C</td></tr>
<tr><td>Q11</td><td>(a) Design a bidirectional algorithm for the Stop and Wait ARQ protocol with the following specifications:
(i) window size 4
(ii) use piggybacking.
Note that both parties need to use the same algorithm.
(b) Design the topology of the network if Table 1 is the routing table for router R1.
Table 1
<table>
<tr><th>Mask</th><th>Network Address</th><th>Next Hop</th><th>Interface</th></tr>
<tr><td>/27</td><td>201.18.17.224</td><td>--</td><td>m1</td></tr>
<tr><td>/18</td><td>135.14.182.0</td><td>--</td><td>m0</td></tr>
<tr><td>Default</td><td>--</td><td>132.45.11.2</td><td>m2</td></tr>
</table></td><td>20</td><td>CO2, CO3</td></tr>
<tr><td>Q12</td><td>Design a Dijkstra’s shortest path algorithm (also write the algorithm) for the topology of the network shown in figure 1. Redraw the network by showing every step in detail and mentioning the cost of links at every node.
 

Figure 1</td><td>20</td><td>CO3</td></tr>
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