KATHMANDU UNIVERSITY
End Semester Examination
August, 2018

Marks Scored:

Level : B.E.
Year : III

Course : ETEG 303
Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date AUG 15 2018

SECTION "A"
[20 Q. × 1 =20 marks]

Choose the most suitable alternative:

1) _____ refers to the physical arrangement of the network.
a) protocol b) mode of operation c) topology d) data flow

2) The information to be communicated in a data communications system is called the _____.
a) medium b) protocol c) message d) transmission

3) _____ connection provides a dedicated link between two devices.
a) P2P b) point-to-multi point
c) primary d) multipoint

4) Frequency of failure and network recovery time after a failure are the measures of the _____ of a network.
a) performance b) reliability c) security d) feasibility

5) _____ is an application layer service.
a) Error correction b) TCP c) Remote Login d) Authentication

6) Internetworking Protocol (IP) is a_____ protocol.
a) connection oriented b) connectionless
c) simplex d) delay-tolerant

7) The _____ layer coordinates the functions required to transmit a bit stream over a physical medium.
a) data link b) network c) transport d) physical

8) A _____ is a set of rules that governs data communication.
a) protocol b) group c) network d) standard

9) The loss of power a signal suffers as it travels from a transmitting computer to a receiving computer is called _____.
a) echo b) jitter c) spiking d) attenuation

10) The _____ product defines the number of bits that can fill the link.
a) delay-amplitude b) frequency-amplitude
c) bandwidth-delay d) bandwidth-period

11) _____ is a protocol suite for internet.
a) Unix b) TCP/IP c) NCP d) ACM

12) _____ is the class for 130.35.54.12 classful address.
a) Class A b) Class B c) Class C d) Multicasting

13) In _____ TDM slots are dynamically allocated to improve bandwidth efficiency.
a) isochronous b) synchronous c) statistical d) asynchronous

14) In PPP _____ is responsible for establishing, maintaining, configuring and terminating links.
a) PAP b) CHAP c) LCP d) NCP

15) _____ controls the amount of data that the sender can send before waiting for acknowledgement.
a) Flow b) Error c) Transmission d) Checksum

16) In a circuit switching, the path _____.
a) upto destination is allocated before the transmission of message begins
b) upto next intermediate node is allocated before the transmission of message begins
c) to be followed depends on the length of message
d) depends on the traffic along the route.

17) The number of addresses in a class C block is _____.
a) 65534 b) 16777216 c) 256 d) 1024

18) In classless addressing, the _____ is the varying part.
a) suffix b) prefix c) host id d) network id

19) In a block, the mask is 255.255.192.0; what is the prefix length?
a) /20 b) /28 c) /18 d) /16

20) _____ augments the CSMA algorithm to detect collision
a) CSMA/CD b) CSMA/CA c) ALOHA d) Token Ring

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SECTION "B"

- ✓ *Attempt any **FIVE** questions*
- ✓ *Assume any suitable data if necessary*
- ✓ *Figures in margin indicate full marks for each questions*

1. a) What do you mean by Network? Explain the TCP/IP model in internet. [4]
   b) Computer A is connected to LAN1 and computer D to LAN2. Computer A sends a message to computer D via LAN1, router and LAN2. Show the contents of packet and frames of the network and data link layer for each hop interface. [3]
   c) Explain the detailed process of encapsulation and de-capsulation in internet. [4]

2. a) Consider a link of length 2000 km, with 10 routers, each having a queuing time of 2 μs and a processing time of 1 μs. The bandwidth of the link is 5 Mbps and the speed of light inside the link is 2×10^8 m/s. Compute the total delay if the frame size is 5 million bits. Which component of the delay is dominant? [3]
   b) Define '*data rate*'. Explain the factors on which data rate depends. Assume that for a particular channel, $SNR = 36\,dB$ and the channel bandwidth $BW = 2MHz$. Calculate the theoretical channel capacity. [4]
   c) Define the analog hierarchy used by telephone companies and also list different levels of hierarchy? [4]

3. a) Explain the process of interleaving. Show the contents of the five output frames for a synchronous TDM multiplexer that combines four sources sending the following characters. Note that the characters are sent in the same order that they are typed. The third source is silent. [2+2=4]
      Source 1 message: HELLO
      Source 2 message: HI
      Source 3 message:
      Source 4 message: BYE
   b) In Figure 1, show the process of frame change in routers R1 and R2? [4]

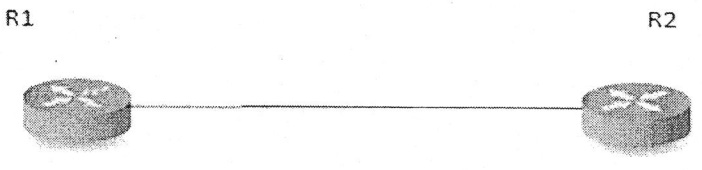

Figure 1.

   c) Compare and contrast a circuit switched and a packet switched network. [3]

4. a) Explain in detail the services provided by the data link layer. [3]
   b) Point out the usefulness of piggybacking. Design a bidirectional algorithm for simplest protocol using piggybacking with FSM. [4]
   c) Explain why collision is an issue in a random access protocol but not in controlled access or channelizing protocols. [4]

5. a) The stations on a wireless ALOHA networks are a maximum of 600 km apart. If we assume that signals propagate at $3 \times 10^8 m/s$, what is the value of T_P? Calculate T_B for different values of K=1, 2, 3. [3]
   b) Explain the mechanism of a CSMA/CD network with a flowchart. Find the value of G that makes the throughput maximum, and find the value of maximum throughput for a pure ALOHA network. [3+2=5]
   c) Define '*congestion*'. How can we control congestion in Network Layers? [3]

6. a) Explain how DHCP can be used when the size of the block assigned to an organization is less than the number of hosts in the organization. [4]
   b) An ISP is granted a block starting with 120.60.4.0/22. The ISP needs to distribute these blocks to 100 organizations with each organizations receiving just 8 addresses. Design the sub-blocks and give slash notation for each sub-block. Find out how many addresses are still available after these allocations. [3]
   c) An organization is granted the block 130.56.0.0/16. The Administrator wants to create 1024 subnets. [4]
      i. Find the subnet mask.
      ii. Find the number of address in each subnet.
      iii. Find the first and last address in subnet 1.
      iv. Find the first and last address in subnet in 1024.