BITS PILANI, DUBAI CAMPUS

Dubai International Academic City

Second Semester 2012 – 2013

Communication Networks ECE C394

Comprehensive Exam (Open Book)

Duration : 3 Hours **Weightage: 40%**

3 June 2013 **MAX: 40 Marks**

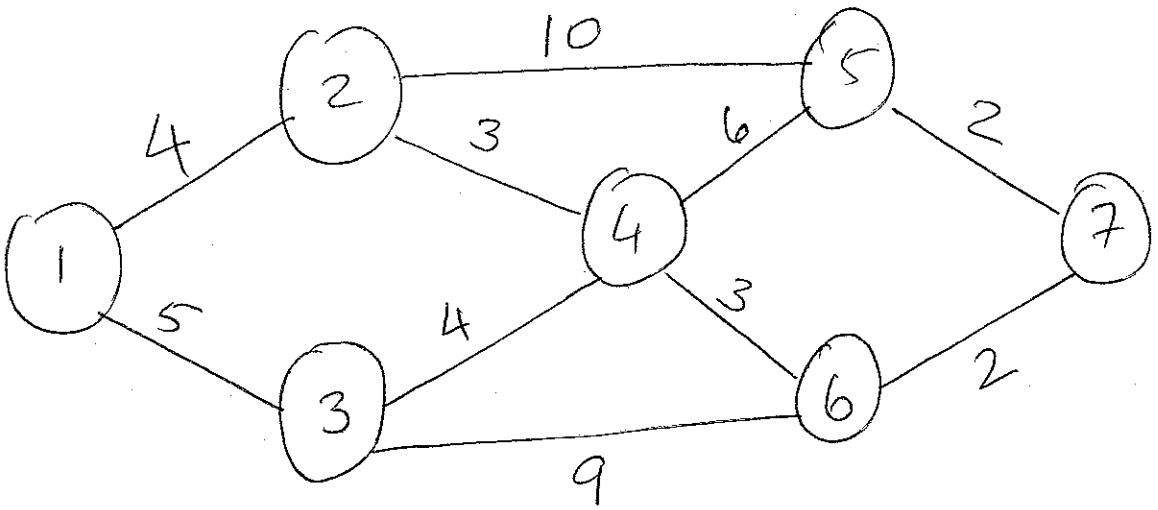
Note: Show all working to get full credit.

Question 1 (3+3+2 = 8 Marks)

For the given node connections (in diagram), find the shortest path routing algorithm with

(i) Nodel 1 as destination node and using Bellman Ford algorithm
(ii) Node 1 as source node and using Dijkstra's algorithm

Draw the network diagram with the routing paths drawn. Comment on each network diagram and on the unused links from the original networks. Compare the network diagrams for the two algorithms.



Question 2 (3+ 2 = 5 Marks)

Suppose an FDDI LAN is used to meet the packet voice requirements of a set of users. Assume voice information uses 64 Kbps coding and that each voice packet contains 20 ms worth of speech.

(a) Assume that each station handles a single voice call and that stations are 100 meters apart. Suppose that the FDDI ring is required to transfer each voice packet within 10 ms. How many stations can the FDDI accommodate while meeting the transfer requirement?
(b) How many simultaneous calls can be handled if each station is allowed to handle up to 8 calls?

Assume the following

(i) the speed of electromagnetic waves in the Optical Fiber is $2x10^8$ m/sec
(ii) Fiber optic ring operates at 100 Mbps
(iii) The latency in each station is 10 bits

Question 3 (1x7 = 7 Marks)

1) What is the bit rate supported in 802.11, 802.11b, 802.11g and 802.11a? What are the corresponding bit rates supported and modulation schemes used with each standard? How do you think the bit rate increase is achieved in these standards?
2) Is Wireless Ethernet possible? Explain.
3) Compare and contrast FDMA, TDMA, CDMA and WDMA in terms of functionality. Classify the following as FDMA, TDMA or CDMA: AMPS, IS-54/IS-136, GSM and IS-95.
4) When designing the MAC layer, how would you choose between Random Access techniques (e.g., ALOHA, Slotted ALOHA, CSMA, CSMA-CD) and Scheduling techniques (e.g., Reservation Systems, Polling, Token-passing rings)?
5) What is the key design parameter in CDMA systems that lead to the high spectrum efficiency as compared to TDMA and FDMA systems? Explain how this high efficiency is achieved.
6) What are the design options for an Ethernet network between two places 2 Km apart and that must support 100 Mbps but be expandable to 10 Gbps. Specify the medium and topology (where applicable).
7) Compare the maximum throughput **and** delay for a token-passing ring for the three token reinsertion methods: multitoken, single token and single frame.

Question 4 (1+1+2+2 = 6 Marks)

1) Can M/M/1 be used with a real-life system? Explain. Identify which model(s) would be most suitable for real-life multiprocessor servers. Explain.
2) If in a real-life system, the arrivals have a Poisson distribution and the servicing is according to Rayleigh distribution, which model most appropriate. Explain.
3) Plot the variation of the average delay in a M/M/1/K system with K for K=5, 10, 15 and 20. Assume that the arrival rate is 0.8 per second and the service rate is 0.9 per second.
4) Plot the variation of the average delay in a M/M/1/K system with utilization for K=20. Assume that the arrival rate is 0.8 per second.

Question 5 (1 + 1+ 1 + 2 + 3 = 8 Marks)

For the following system parameters, calculate the transmission efficiencies using

1) Stop-and-Wait ARQ **(1 M)**
2) Go-Back_N ARQ **(1 M)**
3) Selective Repeat ARQ **(1 M)**

- data frame = 1280 bits
- ACK frames = overhead = 25 bytes
- $2(t_{prop} + t_{proc})$ = 10 ms
- Transmission rate = 1 Mbps
- BER = 10^{-6}
- Window size (when appropriate) = 11

A. Explain your results. **(2 M)**
B. If the sizes of the data frame, ACK frame and overhead cannot be changed, how can the transmission efficiency be improved for <u>each technique</u>. Justify your answer with sample calculations. **(3 M)**

Question 6(1 + 1 + 2 + 2 = 6 Marks)

1) What is the importance of blocking and nonblocking switches? Explain.
2) What is the advantage and disadvantage of Time-Space-Time Switches in comparison with Multistage space switches?
3) For packets of size 1280 bits, would ATM or Ethernet protocol (ignore layer higher overheads) be a good choice? Justify.
4) Identify the range of IPv4 addresses spanned by Class A, Class B and Class C.

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Second Semester 2012 – 2013

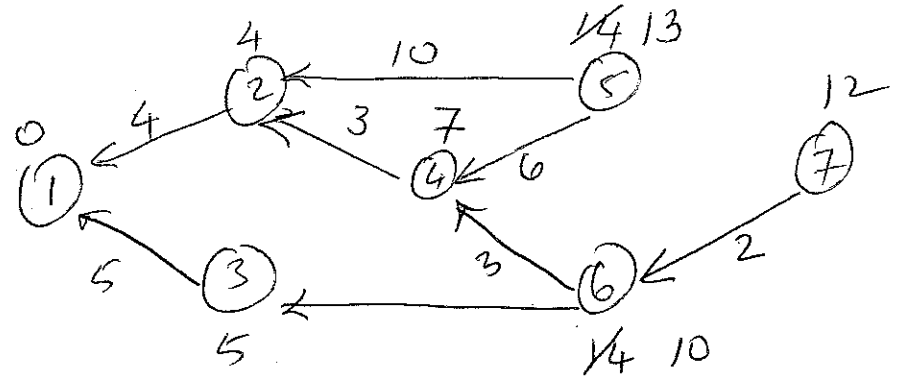
Communication Networks ECE C394

Comprehensive Exam (Open Book) Answering Scheme

Question 1

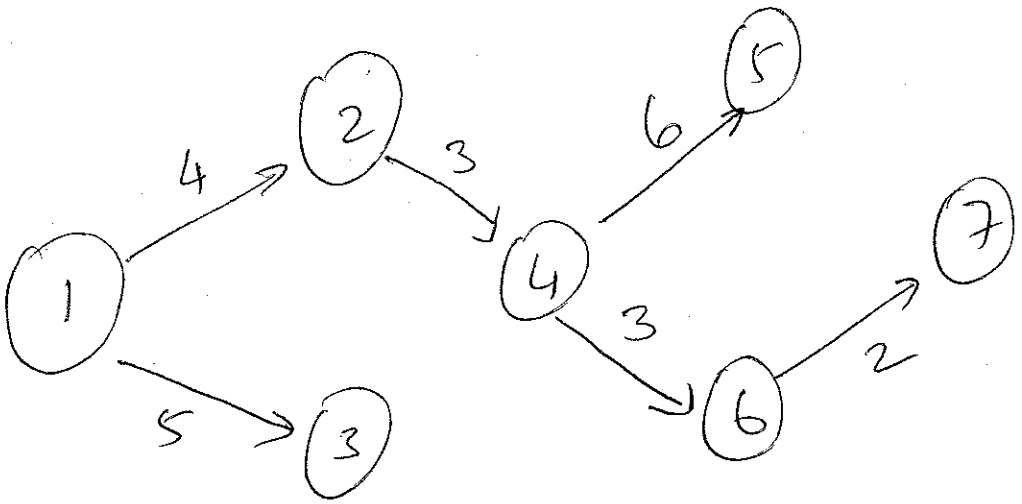
Bellman Ford Algorithm (Destination Node = Node 1)

Iteration	Node 2	Node 3	Node 4	Node 5	Node 6	Node 7
Initial	(-1, ∞)	(-1, ∞)	(-1, ∞)	(-1, ∞)	(-1, ∞)	(-1, ∞)
1	(1,4)	(1,5)	(-1, ∞)	(-1, ∞)	(-1, ∞)	(-1, ∞)
2	(1,4)	(1,5)	(2,7)	(2,14)	(3,14)	(-1, ∞)
3	(1,4)	(1,5)	(2,7)	(4,13)	(4,10)	(6,12)



Dijkstra's Algorithm (Source Destination = Node 1)

Iteration	N	D_2	D_3	D_4	D_5	D_6	D_7
Initial	{1}	∞	∞	∞	∞	∞	∞
1	{1,2}	4	∞	∞	∞	∞	∞
2	{1,2,3}	**4**	**5**	∞	∞	∞	∞
3	{1,2,3,4}	**4**	**5**	7	∞	∞	∞
4	{1,2,3,4,6}	**4**	**5**	7	∞	10	∞
5	{1,2,3,4,6,7}	**4**	**5**	7	∞	10	12
6	{1,2,3,4,5, 6,7}	**4**	**5**	7	13	10	12



No difference between routing table generated by two alg.

Questions 2

$$\tau' = \frac{d}{v} + \frac{Mb}{R} \leq 10ms$$

$$1280 \times \left[\frac{100 \times M}{2 \times 10^8} + \frac{M \times 10}{100 \times 10^6}\right] \leq 10ms$$

↑

64kbps × 20ms

$$1280 \times 60M \leq 10ms \times 10^8$$

$$\leq 10^6$$

$$M \leq \frac{10^6}{1280 \times 60}$$

$$M \leq 14$$

8 calls per station ⇒ 8 interfaces!

$$\Rightarrow 1280\left[\frac{50M}{10^8} + \frac{10 \times M \times 8}{10^8}\right] \leq 10ms$$

$$\Rightarrow 1280\left[\frac{130M}{10^8}\right] \leq 10ms$$

$$\Rightarrow M \leq \frac{10^6}{1280 \times 130}$$

$$M \leq 7$$

Question 3

3.1)

	Frequency Band	Bit Rate	Modulation Scheme
802.11	2.4 GHz	1-2 Mbps	Frequency-Hopping Spread Spectrum, Direct Sequence Spread Spectrum
802.11b	2.4 GHz	11 Mbps	Complementary Code Keying & QPSK
802.11g	2.4 GHz	54 Mbps	Orthogonal Frequency Division Multiplexing & CCK for backward compatibility with 802.11b
802.11a	5-6 GHz	54 Mbps	Orthogonal Frequency Division Multiplexing

The different standrards provide varying bit rates due to the differing signal constellations for the different modulation schemes.

3.2) Wireless Ethernet is not possible since CSMA-CD cannot be used for the following reasons : (1) difficult to detect collisions (2) interference from other LAN users impact the operation of CSMA-CD (3) hidden-station problem.

3.3) In FDMA systems, users are distinguished by frequency; in TDMA systems, users are distinguished by time slots; in CDMA, the users are distinguished by user code; and in WDMA, users are distinguished by wavelength. AMPS is only FDMA, IS-54/IS-136 is FDMA plus some TDMA, GSM is TDMA plus FDMA, and IS-95 is CDMA but has elements of TDMA and FDMA.

3.4) Random access methods may have less waiting time and can have small delays for large bandwidth systems. The scheduling approach is preferred for stringent delay requirements. By their very nature, scheduling approach would guarantee opportunity for every station to transmit.

3.5) The reuse factor is 1. The spread spectrum technique reduces intercell interference. The signals arriving at a mobile station and at a base station are uncorrelated by design.

3.6) (1) 100 Mbps, 100BaseFX, Optical Fiber multimode two strands, star. (2) 1 Gbps, 1000BaseLX, Optical Fiber Single Mode two strands, Star. (3) 10GBaseLR, two optical fibers single mode at 1310 nm, 64B66B. (4) 10GBaseEW, two optical fibers single mode at 1550 nm, SONET. (5) 10GBaseLX4, two optical fibers multi-/single mode with four wavelengths at 1310 nm, 8B10B. For the 10 GBps go for 3,4 or 5.

3.7) There not much difference in maximum throughputs for small normalized ring latency (see Fig 6.25) but large latencies, multitoken is best and single token the worst. A similar trend is seen for delays (Figures 6.42, 6.43 and 6.44).

Question 4

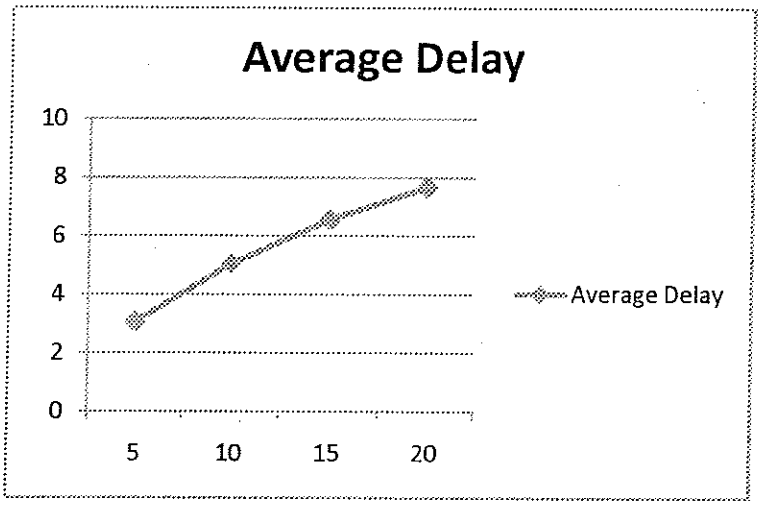
4.1) M/M/1 implies infinite queuing buffer which is not possible in real life systems. M/M/c/K or M/G/c/K have more than one server and finite queuing buffer and would be most suitable for modeling real-life multiprocessor systems.

4.2) M/G/1/K or M/G/c/K would be most approriate for single or multi-server scenarios.

4.3)

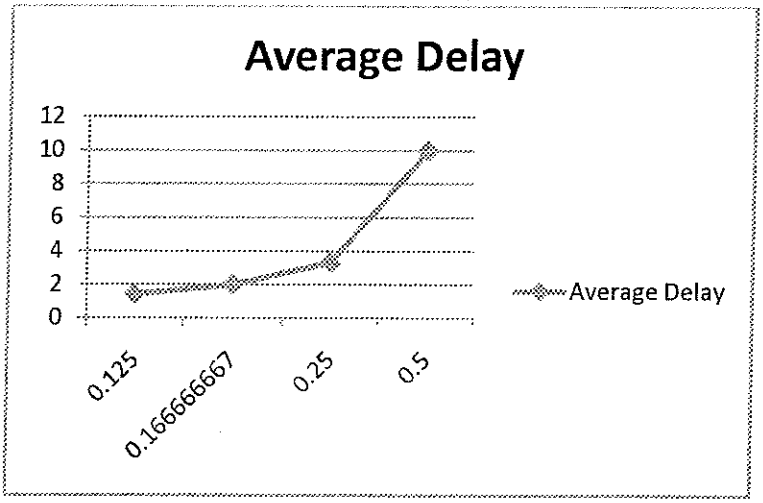
Question 4

λ	μ	ρ	K	p10	E[N]	E[T]
0.8	0.9	0.888889	5	0.12168	2.159371	3.073154
0.8	0.9	0.888889	10	0.047112	3.85412	5.055842
0.8	0.9	0.888889	15	0.022388	5.134286	6.564833
0.8	0.9	0.888889	20	0.011507	6.066873	7.67187



4.4)

λ	μ	ρ	K	p10	E[N]	E[T]
0.1	0.8	0.125	20	7.59E-19	0.142857	1.428571
0.1	0.6	0.166667	20	2.28E-16	0.2	2
0.1	0.4	0.25	20	6.82E-13	0.333333	3.333333
0.1	0.2	0.5	20	4.77E-07	0.99999	9.999905



Question 5

nf	no	na	no/nf	na/nf	reaction time	p	Pf	R
1280	200	200	0.15625	0.15625	0.01	0.000001	0.001279182	1000000

SW eff	Ws	GBN Eff	SR Eff
0.093956	11	0.832028	0.84267069

A. SW is extremely inefficient (9.4%); GBN and SR are better but still only around 84%. The low efficiency is primarily due to the small data frames (in comparison with the ACK and overhead).
B. One way is to change Pf by changing p. But even with $p = 10^{-10}$
We only get the following efficiencies

SW eff	Ws	GNBN Eff	SR Eff
0.094077	11	0.84374881	0.843749892

⇨ No significant change possible for SW or SR
⇨ GBN : Ws > delay-bandwidth product = 10 ms x 1 Mbps = 100000
- Ws > 100000/1280 = 78.15 => Ws = 79

SW eff	Ws	GNBN Eff	SR Eff
0.093956	79	0.76622017	0.84267069

- Becomes even worse !

Question 6

6.1) Nonblocking switches provides every use access but perhaps under utilized and cost ineffective. Blocking switches have the reverse characteristics.

6.2) Multistage space switches are bulkier but faster while TST switches are smaller but slower since memory access is involved.

6.3) 1280 bits = 160 bytes.

ATM : 160/48 => 4 ATM cells needed. Eff = 160/53*4 = 75.5%

Ethernet : 160 bytes can fit in one frame. Eff = 160/(160+26) = 86%

Considering only efficiency criterion, Ethernet can be chose.

6.4)

Class	Leading Bits	# of Net ID bits	# of Host ID bits	Max # of Networks	Max # of hosts per network	Starting Address	Last Address
A	0	7	24	128 (2^7)	16,777,216 (2^{24})	0.0.0.0	127.255.255.255
B	10	14	16	16,384 (2^{14})	65,536 (2^{16})	128.0.0.0	191.255.255.255
C	110	21	8	2,097,152 (2^{21})	256 (2^8)	192.0.0.0	223.255.255.255

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Second Semester 2012 – 2013

Communication Networks ECE C394

Test 2 (Open Book)

Duration : 50 minutes **Weightage : 20%**

28 April 2013 **MAX : 20 Marks**

Note: Show all working to get full credit.

Question 1 (3 + 1 = 4 Marks)

Assume that the information frame is 1250 bytes long, the acknowledgment frame is 25 bytes long and that the overhead is 25 bytes. Assume also that the probability of a bit being in error is 10^{-6}.

1) Calculate and plot the efficiency of the Go-Back-N ARQ protocol against the window size for window sizes 11, 21, and 31.
2) Discuss and analyze the meaning of the plot.

Question 2 (3 + 1 = 4 Marks)

1) Calculate and plot the average delay against ρ for a M/M/1/10 system for ρ = 0.1, 0.5, and 0.9. Assume also that the packets are serviced at a rate of 10 per second.
2) Discuss and analyze the meaning of the plot

Question 3 (5 + 1 = 6 Marks)

Calculate and plot the throughput (S) against the load (G) on one diagram for G = 0.01, 1, 4, 8 and 16 for the following random access techniques.

1) Slotted ALOHA
2) Slotted non-persistent CSMA.(Assume α = 0.001, T = frame transmission time = 0.01 seconds)
3) Slotted 1-persistent CSMA .(Assume α = 0.001)

For G = 0.01, 1 and 16 which technique would you use? Justify your answer.

Question 4 (4 + 1 + 1 = 6 Marks)

1) Walsh-Hadamard matrix W_8 is used to generate 8 channels. User 1 sends the binary data "110" on channel 1, User 2 sends the binary data "010" on Channel 5 and User 3 sends the binary data "001" on Channel 8. Calculate and plot the sum signal that is transmitted.
2) What is the primary reason why the spectrum efficiency of GSM is higher than that of AMPS and IS-54/IS-136? In IS-95 implementation, how are base stations distinguished from one another and how are mobile devices distinguished from one another?
3) In token passing rings, what is the parameter ***a'***? Why is this parameter important?

Some Useful formula

For slotted non-persistent CSMA

$$S_{th} = \frac{\alpha G e^{-2\alpha T}}{(1 - e^{-\alpha G} + \alpha)}$$

For slotted 1-persistent CSMA

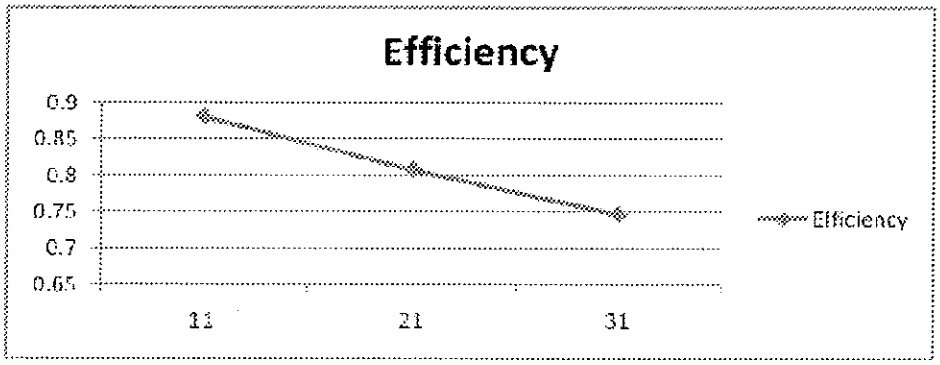
$$S_{th} = \frac{G(1 + \alpha - e^{-\alpha G})e^{-G(1+\alpha)}}{(1 + \alpha)(1 - e^{-\alpha G}) + \alpha e^{-G(1+\alpha)}}$$

ECE 4394, Communication Networks

T2 Answering Scheme.

Question 1

1-Pf	nf	no	Ws	Eff
0.99005	10000	200	11	0.8824441
0.99005	10000	200	21	0.8092127
0.99005	10000	200	31	0.7472045

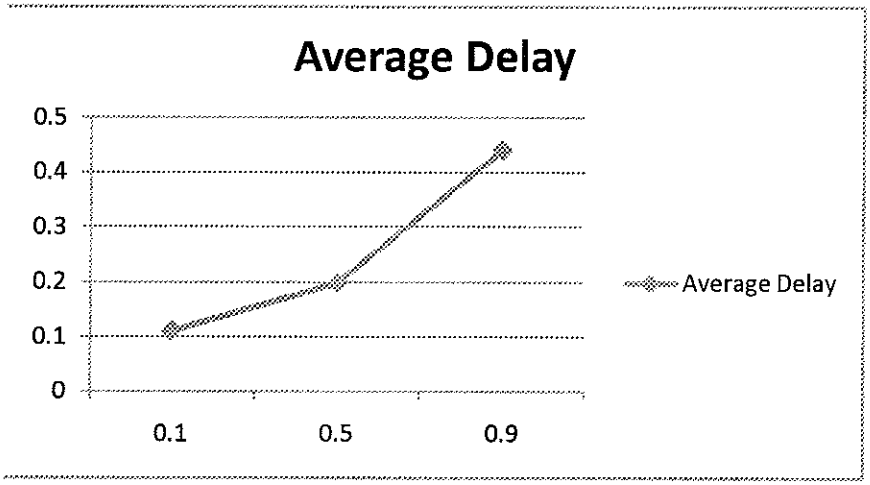


Efficiency decreases with increasing Window size since the window size is an indicator of the size of each retransmision

Question 2

ρ	λ	K	p10	E[N]	E[T]
0.1	1	10	9E-11	0.1111111	0.111111
0.5	5.002444	10	0.00048852	0.9946263	0.198925
0.9	9.481806	10	0.050813731	3.9694406	0.441049

The average delay increases with increase in utilization.
The utilization increase is primarily an increase in arrival rate.
Therefore, the average delay increases with higher arrival rates.

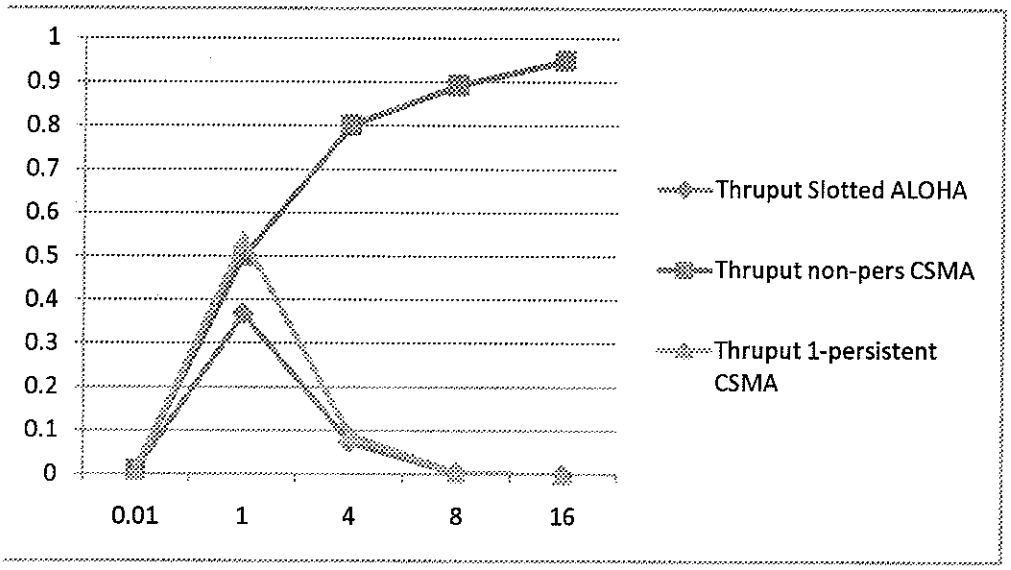


Question 3

G	α	T	S (Slotted ALOH	S (non-p)	S (1-pers)
0.01	0.001	0.01	0.009900498	0.0099008	0.009999
1	0.001	0.01	0.367879441	0.500115	0.537159
4	0.001	0.01	0.073262556	0.8012643	0.090744
8	0.001	0.01	0.002683701	0.8920343	0.002993
16	0.001	0.01	1.80056E-06	0.9482596	1.88E-06

Question 3

G	α	T	S (Slotted ALOH	S (non-p)	S (1-pers)
0.01	0.001	0.01	0.009900498	0.0099008	0.009999
1	0.001	0.01	0.367879441	0.500115	0.537159
4	0.001	0.01	0.073262556	0.8012643	0.090744
8	0.001	0.01	0.002683701	0.8920343	0.002993
16	0.001	0.01	1.80056E-06	0.9482596	1.88E-06

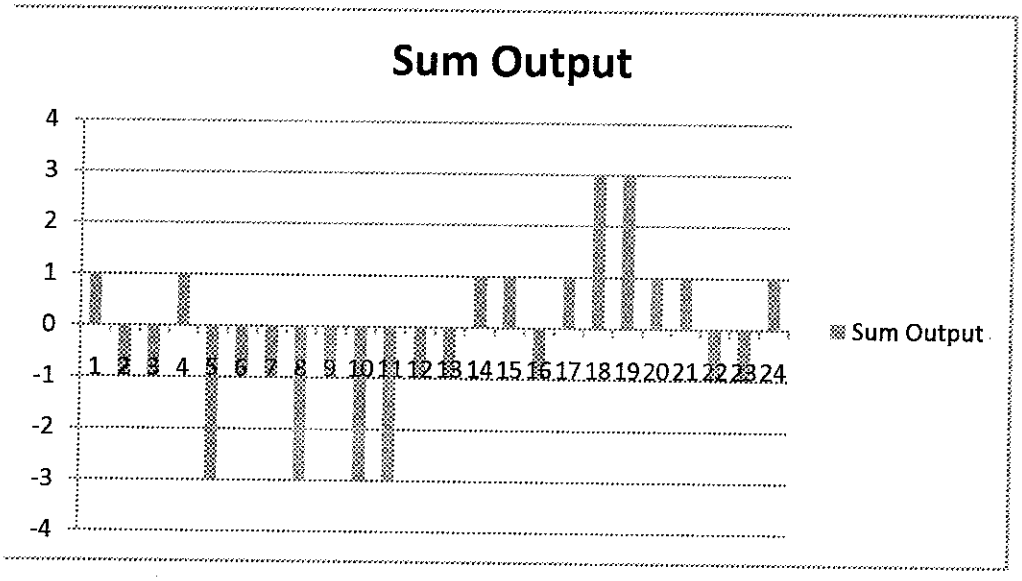


For, G = 0.01 or low loads, any technnique is OK.
For G = 1, either of CSMA techniques are OK.
Fo G = 16, slotted non-persistent CSMA is preferred.
The above selection is based on throughput obtained for various loads.

Question 4

User 1 Data			User 1 Data			Channel 1							
1	1	0	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1
User 2 Data			User 2 Data			Channel 2							
0	1	0	-1	1	-1	-1	-1	-1	-1	1	1	1	1
User 2 Data			User 2 Data			Channel 8							
0	0	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1

Sum Output for First Data Bit	1	-1	-1	1	-3	-1	-1	-3
Sum Output for Second Data Bit	-1	-3	-3	-1	-1	1	1	-1
Sum Output for Third Data Bit	1	3	3	1	1	-1	-1	1



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Second Semester 2012 – 2013

Communication Networks ECE C394

Test 1 (Open Book)

Duration : 50 minutes **Weightage : 25%**

10 March 2013 **MAX : 25 Marks**

Note: Show all working to get full credit.

Question 1 (Total: 17 Marks)

A communication system is to be designed for the following specification:

1) IP Header data
    a. IP version 4
    b. No Options
    c. Total application data size = 2000 bytes
    d. Type of Service (TOS) is not used and can be set to zero.
    e. Header checksum can be set to zero.
    f. The source IP address is class B with Net ID of 2500 and Host ID of 17000
    g. The destination IP address is class C with Net ID of 17000 and Host ID of 135
    h. Fragments are numbered sequentially as 1, 2, 3, ... for fragment 1, fragment 2, fragment 3, ...
2) Assume that UDP is used and UDP Header size is 8 bytes.
3) Two physical layers are being considered
    a. Ethernet has a Maximum Transmission Unit (MTU) of 1500 bytes. The overhead in the Ethernet II frame is 24 bytes.
    b. FDDI has a MTU of 4464 bytes. The overhead in the FDDI frame is 28 bytes.

Answer the following questions.

1) In the IP Header, what is the **Version** value? **(0.5 M)**
2) In the IP Header, what is the header length (**IHL**) value? **(0.5 M)**
3) What are the source and destination IP addresses in **(2 M)**
    a. Dotted-decimal notation (**a.b.c.d** form)
    b. Binary value
4) Assume that two physical layers are possible: Ethernet and Fiber Distributed Data Interface (FDDI)
    a. Is fragmentation required for each of the physical layers? Justify. **(1 M)**
    b. **If fragmentation is required**, for the appropriate physical layer, **(4 M)**

i. How any fragments are required?
ii. What is the value in the **total length** field of the IP Header of each fragment?
iii. What is the fragment offset field in the IP Header for each fragment?
iv. What should be the values of the fragment flags in the IP Header of each fragment?

c. **If fragmentation is *not* required**, for the appropriate physical layer, **(2 M)**
i. What is the value in the **total length** field of the IP Header of packet transmitted?
ii. What should be the values of the fragment flags in the IP Header of packet transmitted?

5) Assume that the packet is discarded after 20 hops in the network. What is the value of the **TTL** field in the IP Header? **(0.5 M)**
6) What is the value of the **protocol** value in the IP Header? **(0.5 M)**
7) Draw a diagram of the IP Header with values in binary **(3 M)**
   a. Of each fragment if fragmentation is required
   b. Of entire packet if fragmentation is not required
8) Calculate the efficiency of data transmitted (at application layer) for the application data size of 2000 bytes for **(3 M)**
   a. Ethernet
   b. FDDI

Question 2 (Total: 8 Marks)

1) How many voice calls can be supported on the CEPT 4 trunk? **(1 M)**
2) Assume that N = 16.
   a. How many cross points are required for a single stage switch? **(0.5 M)**
   b. Design a 3 stage switch. Choose a suitable value of ***n*** and calculate the value of ***k*** to make this switch non-blocking. **(1 M)**
      i. Draw the internal connections for this switch. **(3 M)**
      ii. How many cross points are required in this switch? **(0.5 M)**
   c. Can you design another 3 stage switch with a different choice of ***n*** and ***k*** to make the switch non-blocking? Justify your answer. **(1 M)**
3) Explain the difference between Time Slot Interchange (TSI) and Time Division Switching. **(1 M)**

CN Test 1
Answering Scheme
ECE C394

Q1.1 4 = 0100 (IPV4)

Q1.2 5 = 0101 (IHL)

Q1.3 Source IP address.

Binary form

10 001 1 000 100

Class B

10 001 00 111 000100

Class B — Net ID

0 100 0 0 0 0 0 1 1 0 1 0 0 0
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Host ID

Dotted-Decimal Notation

10001001 . 11000100 . 01000010 . 01101000

137 . 196 . 66 . 104

Dest IP Addr

110 00000010000 1 001101 000

Class C — Net ID

10000111

Host ID.

Dotted-Decimal Notation

11000000 . 01000010 . 01101000 . 10000111

= 192 . 66 . 104 . 135

Q1.4.a Fragmentation required for Ethernet but not for FDDI.

2000 bytes of application data will fit within FDDI MTU limit of 4464 bytes but not for Ethernet MTU limit

Q1.4.b(i) ~~3~~ 2 fragments required for Ethernet

Q1.4.b(ii) Ethernet fragment 1

Total length = ~~20+512 = 532~~ 20+1000 = 1020

Ethernet fragment 2

Total length = 20 + ~~(2000-512)~~ 1000 = ~~1020~~ 1020

~~Ethernet fragment 3~~

~~Total length = 20 + (2000 - 1024) = 996~~ < 1480

Q1.4.b(iii)(iv)

	MF	Frag offset
Fragment 1	1	0
Fragment 2	0	125
~~Fragment 3~~	~~0~~	~~250~~

Q1.4.c FDDI

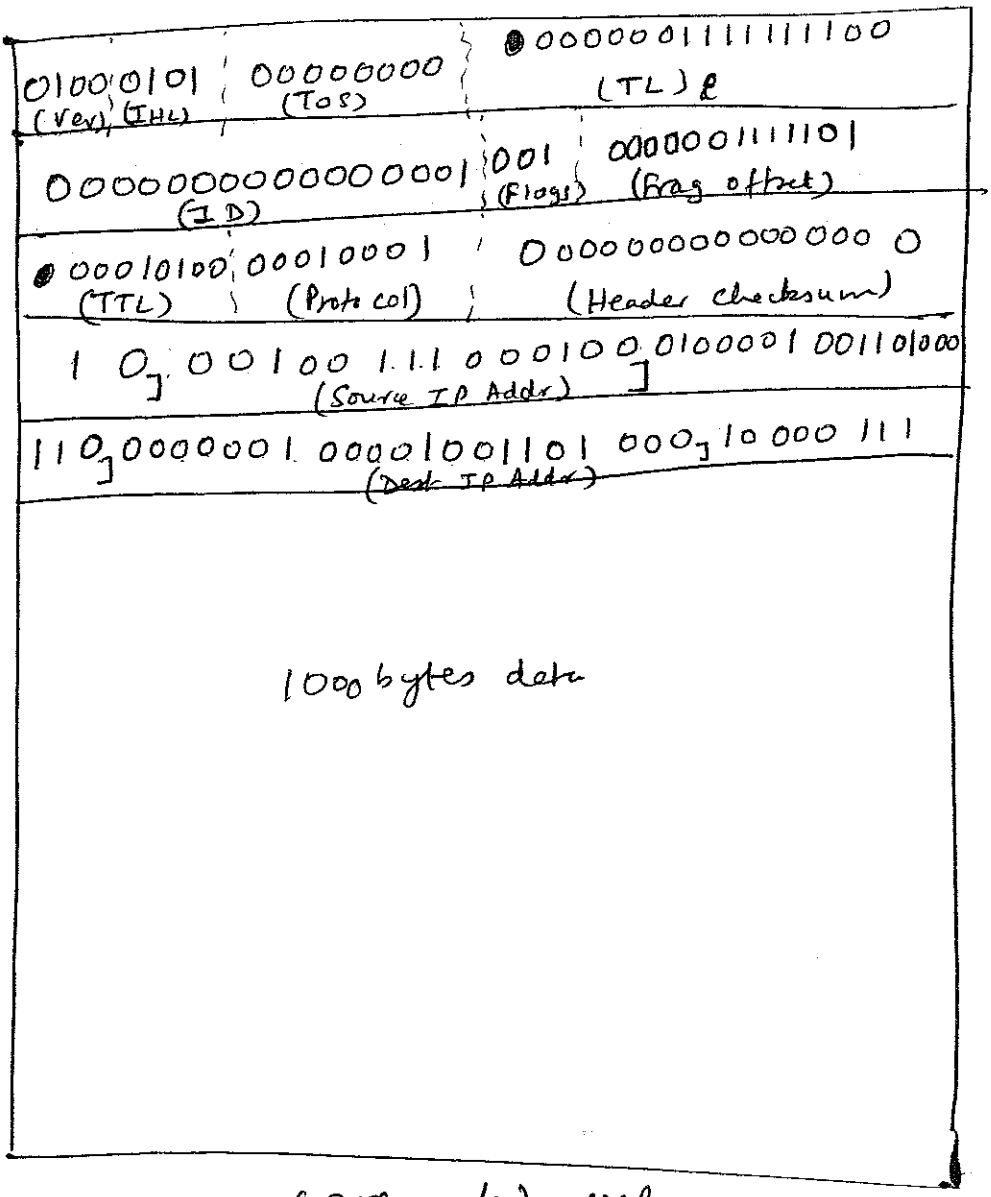
(i) 2000+20 = 2020

(ii) DF = 1 (8 bits) = 00001010~~00~~

Q1.5 TTL = 20 = ~~0~~ ~~000~~

Q1.6 UDP = 17 = 00010001 (8 bits)

Q1.7a Fragment 1 (Ethernet)



for fragment 2 (Ethernet) only changes

ID → 2, Flags → 000 [with this frag offset does not matter]

Q1.7 b IP Packet Header Info for FDDI

No change to Ver, IHL, TOS, TTL, Protocol, Checksum, Source IP Addr, Dest IP Addr fields

ID, Frag offset are don't care

w/ Flags = 01 ●X

Total length Field = 2020

= 0000001111110010 0

Q1.8 Ethernet eff.

Payload = 1000 X2 = 2000

Overhead = [24 + 20 + 20] x2 = 128

$$\eta = \frac{2000}{2128} = 93.98\%$$

FDDI eff

Payload eff Payload = 2000

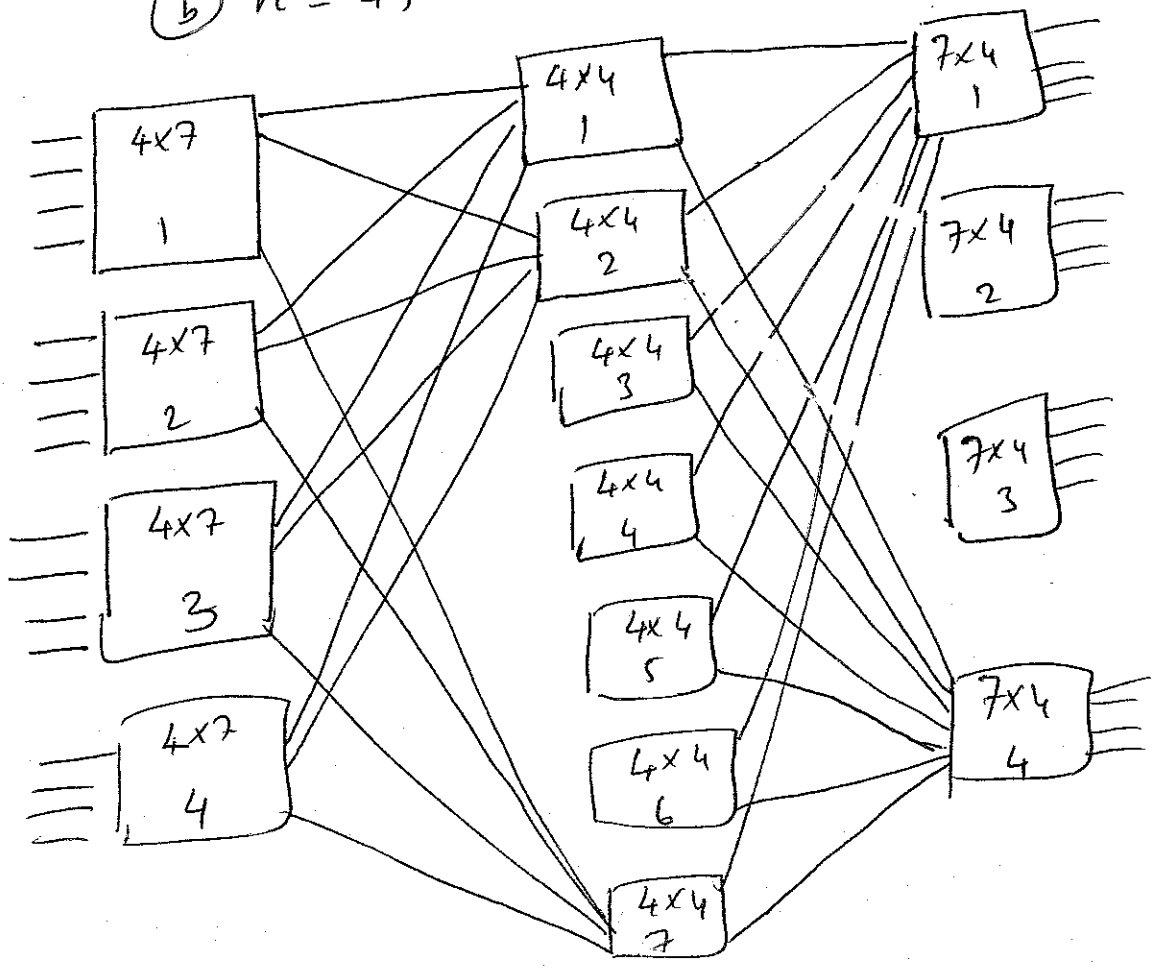
Overhead = 28 + 20 + 20 = 68

$$\eta = \frac{2000}{2068} = 96.71\%$$

Q2.1 30 x 4 x 4 x 4 = 1920 voice channels

Q2.2 (a) $N^2 = 256$

(b) $n = 4$, $K = 2n - 1 = 7$ $\frac{N}{n} = 4$



Q2.2 (b) (ii) $28 \times 8 + 16 \times 7 = 336$

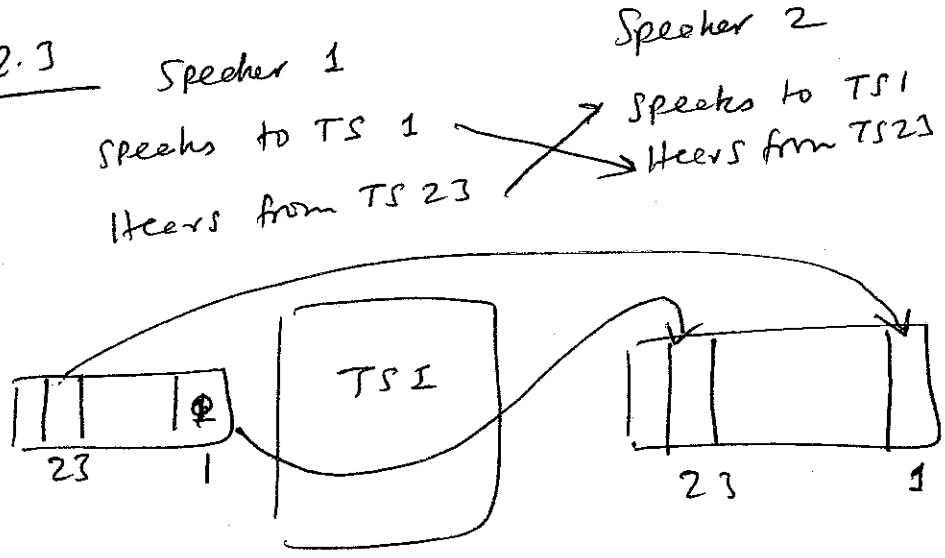
Q2.2c $n = 2 \Rightarrow K = 2n-1 = 3$

$\frac{N}{n} = 8$

$n = 8 \Rightarrow K = 2n-1 = 15$

$\frac{N}{n} = 2$

Q2.3



TS1 $\longleftrightarrow$ TS 23 (TS I)

Time Division Switching happens in A TST switches when the intermediate space switch is time shared between the bank of input time switches.

BITS PILANI, DUBAI CAMPUS

Dubai International Academic City

Second Semester 2012 – 2013

Communication Networks ECE C394 (III year)

Quiz 1 (Closed Book) (Set A)

Duration: 20 minutes **Weightage: 8%**

24 Feb 2013 **MAX: 8 Marks**

Note: Show all working to get full credit.

Name: **ID:**

The following questions carry **0.5 Marks** each unless otherwise specified.

1) What is the largest number of networks can one have in a Class B IP addressing scheme have? **(1 M)**

2) Give an example of layer 7 protocol. _____.

3) Why is fragmentation needed? **(1 M)**

4) ICMP is a layer _____ (number) protocol.

5) Layer 5 of the 7 layer OSI Stack is _____ (name).

6) Which class does the IP address 115.1.10.1 belong to? **(1 M)**

7) The size of the largest payload in a TCP packet is _____.

8) The algorithm used to compute IP Header Checksum is _____.

9) Routing is implemented in _____ (name) layer of the OSI stack.

10) Is 115.1.10.1 a public or private IP address? _____.

11) What is largest trunk size in T-1 carrier? _____ Mbps.

12) The efficiency of data transmission using TCP, IP V4 and Ethernet protocols (using 5 layer TCP/IP Structure) is _____. **(1 M)**

BITS PILANI, DUBAI CAMPUS

Dubai International Academic City

Second Semester 2012 – 2013

Communication Networks ECE C394 (III year)

Quiz 1 (Closed Book) (Set A)

Answering Scheme

Duration: 20 minutes **Weightage: 8%**

24 Feb 2013 **MAX: 8 Marks**

Note: Show all working to get full credit.

Name: **ID:**

The following questions carry **0.5 Marks** each unless otherwise specified.

1) What is the largest number of networks ~~does~~ can one have in a Class B IP addressing scheme have? $2^{14}-1 = 16383$ **(1 M)**

2) Give an example of layer 7 protocol. SMTP or HTTP.

3) Why is fragmentation needed? **(1 M)**
To be able to Transmit $2^{16}-1$ (max IP packet size) bytes in Ethernet protocol that not accomodate more than 1480 bytes in one frame (payload)

4) ICMP is a layer 3 (number) protocol.

5) Layer 5 of the 7 layer OSI Stack is Sessions (name).

6) Which class does the IP address 115.1.10.1 belong to? **(1 M)**

115 = 0111 0011
⇓
Class A

7) The size of the largest payload in a TCP packet is $2^{16} - 1 = 65535$.

8) The algorithm used to compute IP Header checksum is Internet checksum

8) Directory assistance is found in ~~7~~ layer OSI Stack.

9) Routing is implemented in Network (name) layer of the OSI stack.

10) Is 115.1.10.1 a public or private IP address? Public.

11) What is largest trunk size in T-1 carrier? 44.736 Mbps.

12) The efficiency of data transmission using TCP, IP V4 and Ethernet protocols is (using 5 layer TCP/IP Structure) **(1 M)**

$$\frac{1500 - 40}{1500 + 38} = 94.9\%$$

BITS PILANI, DUBAI CAMPUS

Dubai International Academic City

Second Semester 2012 – 2013

Communication Networks ECE C394 (III year)

Quiz 1 (Closed Book) (Set B)

Duration: 20 minutes **Weightage: 8%**

24 Feb 2013 **MAX: 8 Marks**

Note: Show all working to get full credit.

Name: **ID:**

The following questions carry **0.5 Marks** each unless otherwise specified.

1) What is the largest number of networks can one have in a class C IP address scheme? **(1 M)**

2) _____(name) is a Transport layer protocol.

3) The size of the largest payload in an IP packet is _____.

4) The algorithm used to compute IP Header Checksum is _____.

5) The efficiency of data transmission using UDP, IP V6 and Ethernet protocols is (using 5 layer TCP/IP structure) _____. **(1 M)**

6) SMTP is an example of layer _____ (number) protocol.

7) ICMP is a layer _____ (number) protocol.

8) Flow control is implemented in _____ (name) layer of the OSI stack.

9) Why is fragmentation of packets needed? **(1 M)**

10) Is 272.16.10.1 a public or private IP address? _____.

11) What is the largest trunk size in the E-1 carrier? _____ Mbps.

12) Which class does the IP address 272.16.10.1 belong to? **(1 M)**