Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS / MCA / SEM-2 / MCA-201 / 2011

2011

DATA COMMUNICATION AND COMPUTER NETWORK

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words

as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1.   Choose the correct alternatives for the following :   10 × 1 = 10

   i)   The subnet mask for a particular network is 255.255.31.0. Which of the following pairs of IP addresses could belong to this network ?

      a)   172.57.88.62 and 172.56.87.23

      b)   10.35.28.2 and 10.35.29.4

      c)   191.203.31.87 and 191.234.31.88

      d)   128.8.129.43 and 128.8.161.55.

ii)   The address resolution protocol (ARP) is used for

  a)   finding the IP address from the DNS

  b)   finding the IP address of the default gateway

  c)   finding the IP address that corresponds to a MAC address

  d)   finding the MAC address that corresponds to an IP address.

iii)   If the bandwidth of a signal is 5 kHz and the lowest frequency is 52 kHz, what is the highest frequency ?

  a)   5 kHz   b)   10 kHz

  c)   47 kHz   d)   57 kHz.

iv)   Phase transition for each bit are used in

  a)   Amplitude modulation

  b)   Carrier modulation

  c)   Manchester encoding

  d)   NRZ encoding.

v)   If 10 devices are arranged in a mesh topology, how many ports are needed for each device ?

  a)   10   b)   20

  c)   21   d)   9.

vi)   Which layer converts bit into electromagnetic signals ?

  a)   Session   b)   Network

  c)   Transport   d)   Physical.

vii) Bit stuffing refers to

    a)   inserting a 0 in user stream to differentiate it with a flag

    b)   inserting a 0 in flag stream to avoid ambiguity

    c)   appending a nibble to the flag sequence

    d)   appending a nibble to the use data stream.

viii) If there are five routers and six networks in an intranet using link state routing, how many routing tables are there ?

    a)   1   b)   5

    c)   6   d)   11.

ix) The subnet mask 255.255.255.192

    a)   extends the network portion to 16 bits

    b)   extends the network portion to 26 bits

    c)   extends the network portion to 36 bits

    d)   has no effect on the network portion of an IP address.

x) Which of the following transmission media is not readily suitable to CSMA operation ?

    a)   Radio   b)   Optical fibres

    c)   Coaxial cable   d)   Twisted pair.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Find out the capacity of a telephone line that transmits frequencies from 300 Hz to 3400 Hz with an SNR of 35 DB.

   5

3. Explain ALOHA and slotted ALOHA. Compare them. 5

4. Explain TCP and UDP. Indicate the difference between them.
   5

5. Compare IP addressing and MAC addressing. 5

6. What is CSMA / CD ? Explain with justification of CSMA / CD can be put to use in wireless LAN. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) In a stop-and-wait ARQ system, the bandwidth of the line is 1 Mbps and it takes 20 ms for a bit to make a round trip. If the system data frames are 1000 bits long, what is the utilization percentage of the link ? How is the utilization percentage altered in case of the above frame size is increased by 10% ? 4 + 2

b) Indicate the advantages of optical fibre over twisted pair and coaxial cables. 2 + 2

c) What is IP addressing ? What are the different classes of IP addressing ? What is the difference between static and dynamic IPs ? 1 + 2 + 2

8. a) Explain various HDLC addressing modes that are in use. Indicate two disadvantages of HDLC. 3 + 2

b) Explain bit rate and baud rate. How are they related ?

(1 + 1) + 1

c) State the advantages of frequency modulation over amplitude modulation. 2

d) Using time division multiplexing technique compute throughput of the following system :

There are four nodes in the network having loads 20k, 35k, 58k and 10k respectively. Each time slot accommodates 5k of data. Propose a method to improve the system and also calculate the throughput using the improved method. 5

9. a) Using Dijktra's algorithm, can you find the shortest routing path from node 1 to node 6 below ?
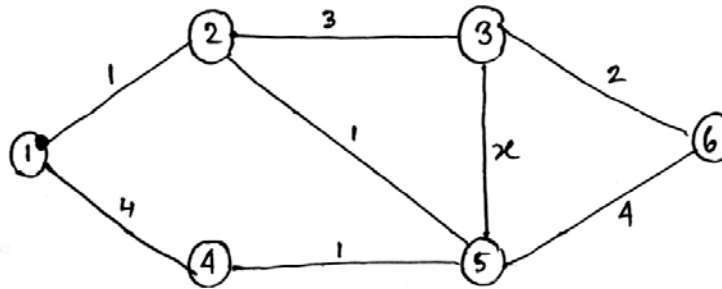
Critically examine the possible values of x with subsequent implications. 8

b) What are static and dynamic routing ? 3

c) What is OSPF ? Explain. 4

10. a) Is it possible to detect the error bit, if any, using Hamming code, if the received bit sequence is 10010100101 ? Justify. 3

b) Explain how collision detection is handled in CSMA/CD. 5

c) Describe Manchester and differential Manchester encoding with the same example. 4

d) Compare ARP and RARP. 3
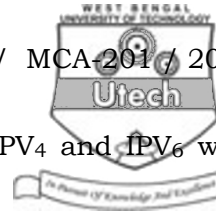
11. a) Write down the difference between IPV$_4$ and IPV$_6$ with suitable example. 4

   b) Compare packet and frame. 2

   c) Describe leaky bucket algorithm. 4

   d) Write short notes on any *one* of the following : 5

   i) CRC

   ii) CIDR.

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