

KATHMANDU UNIVERSITY  
End Semester Examination  
May/June, 2022

Marks Scored:

Level : B.E./B.Sc.

Year : II

Exam Roll No. :

Time: 30 mins.

Course : COMP 204

Semester : II

F. M. : 10

Registration No.:

Date : *June-05, 2022*

SECTION "A"  
[20 Q. × 0.5 = 10 marks]

Encircle the most appropriate option.

- How many layers are there in OSI reference model?  
a. 5                      b. 8                      c. 7                      d. 6
- The information to be communicated in data communication system is .....  
a. Medium              b. Message              c. Protocol              d. Transmission
- Frequency of failure and network recovery time after a failure is a measure of .....  
of the system.  
a. Performance      b. Feasibility              c. Security              d. Reliability
- Communication between a computer and a keyboard involves ..... Transmission  
a. Automatic              b. Simplex              c. Half duplex              d. Full Duplex
- For a 10Mbps Ethernet link, if the length of the packet is 32bits, the transmission delay is  
(in microseconds)  
a. 3.2                      b. 32                      c. 0.32                      d. 320
- DHCP server provides ..... to the clients.  
a. Protocol              b. IP address              c. MAC address              d. Network address
- Assuming that the channel is noiseless, if TV channels are 8 kHz wide with the  
bits/sample = 3Hz and signaling rate =  $16 \times 10^6$  samples/second, then what would be the  
value of data rate?  
a. 16 mbps              b. 24 mbps              c. 48 mbps              d. 64 mbps
- If the channel is bandlimited to 6 kHz & signal to noise ratio is 16, what would be the  
capacity of channel?  
a. 15.15 kbps              b. 24.74 kbps              c. 30.12 kbps              d. 52.18 kbps
- A signal is measured at two different points. The power is P1 at first point and P2 at the  
second point. If dB=0, this means,  
a. P2 is zero              b. P2 equals P1  
c. P2 is much larger than P1              d. P1 is much larger than P2

10. A generator that contains a factor of ..... can detect all odd-numbered errors.  
 a.  $x$                       b.  $x + 1$                       c.  $x^n$                       d. none of these
11. In Go-Back-N ARQ, if frames 4, 5 and 6 are received successfully, the receiver may send an ACK ..... to the sender.  
 a. 5                      b. 6                      c. 7                      d. Any of the above
12. How error correction and detection is done?  
 a. By passing it through equalizer                      b. By passing it through filters  
 c. By amplifying the signal                      d. By appending redundant bits
13. For Stop-and-wait ARQ, for 10 data packets sent, ..... acknowledgement are needed  
 a. Less than 10                      b. More than 10                      c. Exactly 10                      d. None of these
14. In Selective Repeat ARQ, if 5 is the number of bits for the sequence number, then the maximum size of the receive window must be .....  
 a. 15                      b. 16                      c. 31                      d. 1
15. A noiseless 3 KHz channel transmits bits with binary level signals. What is the maximum data rate?  
 a. 3 kbps                      b. 6 kbps                      c. 12 kbps                      d. 24 kbps
16. Maximum data rate of a channel of 3000 Hz bandwidth and SNR of 30 dB is  
 a. 75000 bps                      b. 60000 bps                      c. 45000 bps                      d. 30000 bps
17. The first and the last IP address of a given ip address 250.15.18.31/25 is  
 a. 250.15.18.0 and 250.15.18.255                      b. 250.15.18.0 and 250.15.18.127  
 c. 250.15.18.255 and 250.15.18.0                      d. 250.15.18.127 and 250.15.18.0
18. In hamming code C(7,4) with  $d_{min}=3$ , three bit syndromes creates eight different bit patterns that creates eight different conditions. Which of the following option shows no error or the error in parity bit only  
 a. 000, 001, 010, 100                      b. 011, 101, 110, 111  
 c. 001, 010, 011, 101                      d. 100, 101, 110, 111
19. A signal travels through an amplifier and its power is increased 10 times. Then the amplification is:  
 a. 1 dB                      b. 10 dB                      c. 5dB                      d. 20 dB
20. During bit stuffing, after how many consecutive 1 bits followed by a zero, a zero bit is added?  
 a. 2                      b. 6                      c. 4                      d. 5

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SECTION "B"

[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Explain TCP/IP model with block diagram. Differentiate between connection oriented and connectionless services.
2. Explain why is Shannon Capacity more practical than Nyquist Bit Rate? A line has a Signal to Noise Ratio(SNR) of 2000 and a bandwidth of 5000 KHz. What is the maximum data rate supported by this line?
3. Explain transmission mode of data communication with diagram.
4. List out the function of Data Link Layer. Explain the equation of cyclic codes using polynomial. [2+2]
5. Explain the working mechanism of Stop and Wait ARQ with suitable flow diagram.
6. Define subnetting. Explain why subnetting is required with suitable example. Find the first and last address of 230.57.26.82/27 [1+1+2]
7. Write Short notes on *ANY TWO*. [2+2]
  - a. Fibre optic transmission
  - b. Count to infinity problem
  - c. HTTP protocol

SECTION "C"

[2 Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. Explain the hamming code for one-bit error correction with detail process and diagram of both ends. Also demonstrate how two-bit error in this case cannot be corrected.
9. Explain the working mechanism of CDMA in detail with suitable example.
10.
  - a. Explain the working mechanism of CSMA/CD with flow diagram. [6]
  - b. In a CSMA/CD network, assume we have a bus network topology with only two stations, A and B in which  $T_{fr} = 60 \mu s$  and  $T_p = 40 \mu s$ . Station A starts sending a frame at time  $t = 0.0 \mu s$  and station B starts sending a frame at  $t = 35.0 \mu s$ . Do the frames collide and if yes then, does station A and Station B detect collision? [2]

