PRANVEER SINGH INSTITUTE OF TECHNOLOGY KANPUR

Even Semester Session 2023-24 Pre-University

B. Tech. VI Semester

Computer Networks (KCS-603)

CO Number	Course Outcome
CO1	**Define [L1: Remember]** different protocols, switching methodology, communication techniques available for voice and data network.
CO2	**Describe [L2: Understand]** different Network Protocols and components of networks.
CO3	**Apply [L3: Application]** different methodologies, cryptographic and error handling mechanisms to implement a secure, fast, error free and congestion free network.
CO4	**Analyze [L4: Analysis]** and measure the performance of different network protocols.

Time: 3 Hrs. M. M. 100

Section A

Q1. Attempt all questions: **(2X10 =20 Marks)**

a) Define bit rate and baud rate. A digital signal has 16 levels find total bits needed per level. CO1

b) List the advantages and disadvantages of Ring topology and Bus topology. CO1

c) Sketch the NRZ-L, NRZ-I, Manchester and Differential Manchester encoding for the given bit stream 0001110101. CO3

d) If a data word is 1011, then construct the hamming code which is send to receiver. CO3

e) Differentiate between the Router and Gateway used as a networking device. CO2

f) Explain Piggybacking. CO2

g) Describe 1-persistent & non-persistent methods used in CSMA. CO2

h) Explain Character stuffing with proper example. CO2

i) Compare IMAP vs POP3. CO2

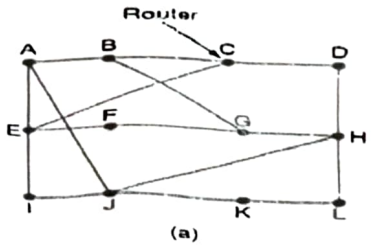
j) Describe "count-to-infinity problem" with an example. CO2

Section B

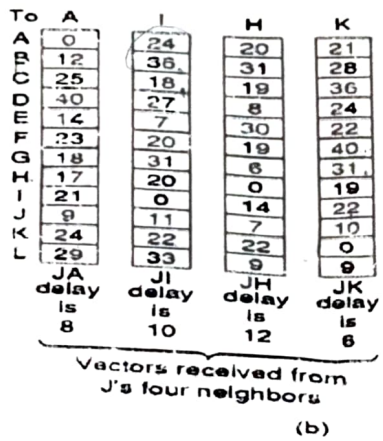
Q2. Attempt all questions. **(10X3 = 30 Marks)**

(a) Divide a large single network having IP address **198.10.2.0** into **3** subnets such that two of them contain **62** hosts each and one contains **120** hosts. Estimate each subnet-id, broadcast address and number of usable hosts in each subnet. CO4

b (i) Routing Table for A, I, H, K is given below, where they are neighbors of J. Suppose that J has measured its distance to its neighbor A, I, H and K are 8,10,12,6 respectively. Calculate the new routing table for J. CO3



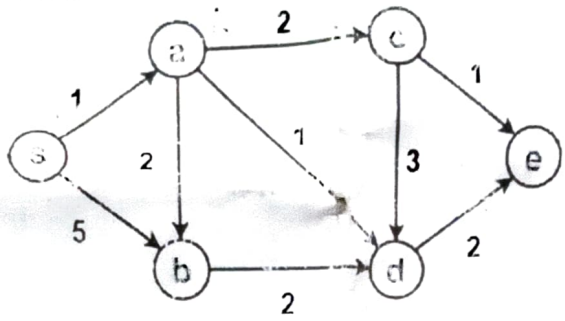
(a)



(b)

OR

(ii) Apply shortest path routing for calculating routing tables of nodes given in below network diagram for given source as **s** and destination **c**. CO3



c (i) A bit stream **100111001** is transmitted using CRC method. The generator polynomial is x^3+x+1. Show the actual bit string transmitted. Suppose the fourth bit (**100111001**) from ~~left~~ right is inverted during transmission. Illustrate that this error is detected at the receiver end. CO2

OR

(ii) Generalize why size of sliding window is less than 2^m for Go-Back-N ARQ if header of frame allows m bits for sequence number and calculate the efficiency of Go-Back-N ARQ protocol for sender window size=**10** , T_p =**24.5** ms and T_f= **1**ms. CO2

Section C

Q3. Attempt all questions: **(10X5 = 50 Marks)**

a i) Illustrate the concept of slotted ALOHA with the help of a flow chart and if a pure ALOHA network transmits **250**-bit frames on a shared channel of **250** kbps. Calculate the throughput and analyse your answer if the system (all stations together) produces (i)**1000** frames per second (ii) **250** frames per second (iii) **500** frames per second. CO4

OR

ii) Illustrate the concept of Leaky Bucket and Token bucket algorithm for improving quality of service. A computer on a 3 Mbps network is regulated by leaky bucket and has buffer of 4 M Bytes which initially filled at a rate of **4** Mbps for **5** seconds then again filled to a capacity with **8** Megabits for **3** seconds. How long can computer transmit with full capacity. Analyze your answer with respect to underflow/overflow/normal situation. CO4

b i) Explain Circuit Switching, Packet Switching & Message Passing in detail with example. CO2

OR

ii) Explain Clark's & Nagle Solution to Silly Window Syndrome. CO2

c i) Explain the symmetric and asymmetric key cryptography and explain the RSA algorithm with an example. CO2

OR

ii) Describe Shannon theorem. Calculate the capacity of a channel with a **6** KHz bandwidth. The SNR for this channel is **63**. CO2

d i) Describe token ring protocol. A **2** Mbps token ring has a token holding timer value of **10** ms. Calculate the longest frame that can be sent on this ring. CO2

OR

ii) Explain IEEE 802.3 and IEEE 802.4 frame format. Also explain its all field in brief. CO2

e i) Explain the following: (i) FTP (ii) DNS (iii) HTTP (iv) ARP CO2

OR

ii) Draw IPv4 frame format and explain its field. CO2