

National Institute of Technology, Rourkela

Name of the Examination: B. Tech. Mid-Semester (Spring 2021-22)

Branch : CS

Semester : VI

Title of the Course : Computer Networks

Course Code : CS3002

Time: 2 Hours

Maximum Marks: 30

Note : (i) Answer all questions.

(ii) Write all answers of a question at one place.

1. Answer the following questions:

(a) A large population of ALOHA users manage to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 msec. **[3 Marks]**

(i) What is the chance of success on the first attempt?

(ii) What is the probability of exactly k collisions and then a success?

(iii) What is the expected number of transmission attempts needed?

(b) Consider the delay of pure ALOHA versus slotted ALOHA at low load. Which one is less? Explain your answer. **[2 Marks]**

2. Answer the following questions:

(a) Discuss the issues in the data link layer. **[2 Marks]**

(b) Explain the key differences between OSI and TCP/IP reference models? **[3 Marks]**

3. Answer the following questions:

(a) Explain the channel allocation methods for broadcast networks. Give advantages and disadvantages of these methods? **[3 Marks]**

(b) A disadvantage of a broadcast subnet is the capacity wasted when multiple hosts attempt to access the channel at the same time. As a simplistic example, suppose that time is divided into discrete slots, with each of n hosts attempting to use the channel with probability p during each slot. What fraction of the slots will be wasted due to collisions? **[2 Marks]**

4. Answer the following questions:

(a) Sixteen-bit message are transmitted using a Hamming code. How many check bits are needed to ensure that the receiver can detect and correct single-bit errors? Show the bit pattern transmitted for the message 1101001100101101. Assume that even-parity is used in the Hamming code. **[3 Marks]**

(b) What is the maximum overhead in byte-stuffing and bit-stuffing algorithms? **[2 Marks]**

5. Answer the following questions:

(a) Explain the following two protocols:

[3 Marks]

(i) A Bit-Map Protocol

(ii) The Binary Countdown

(b) Give the differences between the CSMA and Adaptive Tree Walk Protocol?

[2 Marks]

6. Answer the following questions:

[1.5 + 1.5 + 2 = 5 Marks]

(a) Explain the differences between the Simplex protocols and Sliding window protocols?

(b) Explain the drawback of 1-bit sliding window protocol?

(c) Explain the key differences between Token Bus and Token Ring networks?



National Institute of Technology, Rourkela

Dept. of Comp. Sc. & Engg.,

Mid Sem Spring Exam FEB 2022

Course Name: DISTRIBUTED SYSTEMS

Course Code: CS3006 Time: 2.0 Hours FM: 30

Date of Exam: 23nd FEB 2022

Instruction: (1) ANSWER ALL QUESTIONS

(2) Q1 through Q3 carries 10 marks each

(3) Answers should be brief and to the point

Q1. Answer the following briefly

- (a) Differentiate between transparency and concurrency in a distributed system.**
- (b) Differentiate between Distributed System and Computer Network.**
- (c) Why it is difficult to design a distributed system?**
- (d) Can the distributed systems be built on the top of a LAN? Justify.**
- (e) Write the role of protocol and standards for communication in a distributed system.**
- (f) What do you mean by light weight messaging system?**
- (g) What are the components of a distributed system? Show using a diagram.**
- (h) How the various events in a distributed system can be ordered in the absence of global clock?**
- (i) What is syndrome decoding? Explain with examples.**
- (j) Differentiate between Client-server & Peer to peer protocol.**

Q2. Write the answer with justification:

- (i) Illustrate the protocols such as R, RR, and RRA protocol with a diagram and a comparison table.**
- (ii) State “TRUE” or “FALSE”. “WWW is a distributed system but Internet is a computer network”.**
- (iii) What is NIC in a distributed system? What are various components in an NIC?**

(iv) What is the need of marshalling and unmarshalling in a distributed system? Give an example scenario for the marshalling and unmarshalling.

(v) Differentiate between IPC and RPC. Illustrate using a diagram.

(vi) What do you mean by RPC Call Semantics? Which is better? Justify.

(vii) What features justify the periodic execution of diagnostic software in a large scale distributed system?

(viii) Write the classification of faults in a distributed system with respect to behavior and duration of the fault.

(ix) What is state holding time? Explain with an example.

Q3. (a) Write the similarities & difference between following using a table.

- i) Synchronous Vs. Asynchronous Distributed Systems**
- ii) Reliable Vs. Unreliable Systems**
- iii) Completely Connected Vs. Not-Completely Connected Topology**
- iv) Monolithic Vs. Microkernel Architecture**
- v) Syndrome Decoding Vs. Fault Model**

(b) A node in a distributed system can work on two types of tasks. Type-1 tasks arrive according to a Poisson process with a rate of 100 per second and type-2 tasks according to a Poisson process with a rate of 200 per second. The two arrival processes are independent. Both types of tasks have exponentially distributed service times, with a mean of 3 milliseconds. Tasks are processed in order of arrival.

(i) What is the probability that during 10 milliseconds no new tasks arrive?

(ii) Determine the mean number of tasks at the node