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) Diffentiate 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