राष्ट्रीय प्रौद्योगिकी संस्थान पटना National Institute of Technology Patna

Assignment 1 (Jul-Dec'21) Department: Computer Science and Engineering Session: 2021-22 Autumn'21 Sem

Programme: B.Tech.-CS-7th Sem Course Code: **CS7479** Course: **Distributed Systems**

Maximum Marks: 10 Submission deadline: 08-Dec-2021, 17:30 hours

[Attempt all questions; Answer concisely only in blue/black ink; Use pencil for artwork; Assume any suitable data, if necessary]

[Single PDF file of your scanned assignment report is to be uploaded within deadline.]

[Mark, Course Outcome (CO) and Bloom's Level (BL) are mentioned on right-hand side of each question] [Rubrics are given after the questions]

Sl.	No.	Questions	CO	BL
1.		Consider Google's Chubby Service, where the service is executed for consensus with 5 replicas following Paxos consensus protocol. In the service, a leader/primary proposes (or, prepares) values for a sequence of log entries. For any log entry **L** in the sequence, each primary produces its own *view*, and primary fails. This results in a series of views, from each different primary (which can be numbered as P_{view1}, P_{view2}, P_{view3},…). Consider the following example: Primary P_{view2} proposes a value v that overwrites a different value w that previous primary P_{view1} has proposed for **L**, even though later primary P_{view3} is aware of w, i.e., w has been accepted by at least one member of its voting majority (or, quorum) and P_{view3} has learnt from that member.		
	a.	Determine a *succession of detailed events* in the above example so that consensus is reached by Paxos at the end of $view_3$. (6) [Course outcome evaluated: CO-5(Analyse/Determine)]	CO-5	Level-4
	b.	Explain whether your example will reach consensus, if P_{view3} does not learn about w or v or both the values. (4) [Course outcome evaluated: CO-3(Understand/Explain)]	CO-3	Level-2

Rubric for (1.a):

Criteria	Levels of performance	Award
Accuracy of events in the succession	▪ Answer has accurately mentioned about events involving P_{view1}, P_{view2} and P_{view3}	3 marks
	▪ Answer has omitted events or incorrect events involving P_{view3}, but remaining all events involved with P_{view1} and P_{view2} are accurate	2 marks
	▪ Answer shows omitted events or incorrect events involving P_{view1} and P_{view2}, but events involved with P_{view3} are accurate	1 mark
Order of events in the succession	▪ Answer has correct order of events in the succession, and logical consequence of that order leads to consensus	1 mark
Clarity in writing	▪ Answer has clear presentation of event details in the succession	2 marks
	▪ Answer has significant deviation of clarity from the problem	1 mark
Max. marks = 6		

Rubric for (1.b):

Criteria	Levels of performance	Award
Accuracy of explanation	▪ Answer has accurate explanations of 3 possibilities of P_{view3} in satisfying or violating consensus	2 marks
	▪ Answer has accurate explanation of any of the 3 possibilities of P_{view3} in satisfying or violating consensus	1 mark
Clarity in writing	▪ Answer has clear explanations	2 marks
	▪ Clarity of explanations significantly deviating from the problem	1 mark
Max. marks = 4		