

DISTRIBUTED COMPUTING AND BIG DATA
MARKS: 25.

DURATION: 60 MINS. MAX

ROLL NO.: _____

DATE: 07/10/2023

NAME: _____

Instructions

- This is an individual task. Do not discuss with anyone.
- This is a closed book test. However, you are allowed to bring a hand-written A4 size sheet.
- Please stop writing after 60 minutes.
- After the exam, submit the question paper, answer sheet, your cheat sheet and any rough sheets.

Section 1: Questions carry 1 marks each. -0.5 for a wrong answer.

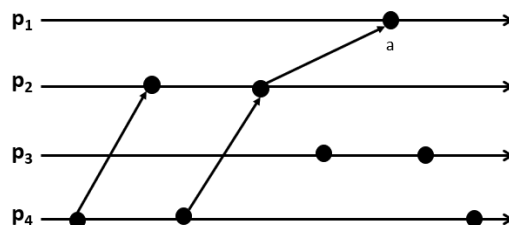
Question 1. Read time is the time taken to spin $1/2$ of a sector. True/False?

Question 2. Mappers are executed in the data nodes. True/False?

Question 3. Objects have identity while classes do not. True/False?

Section 2: Questions carry 2 marks each. -1 for a wrong answer.

Consider the following space-time execution diagram for answering all the questions in this Section.



Question 4. a) Draw a consistent cut. (1 mark) b) Draw an inconsistent cut. (1 mark)

Question 5. If we were to annotate with **scalar** time stamps, how would we annotate the event marked as 'a'?

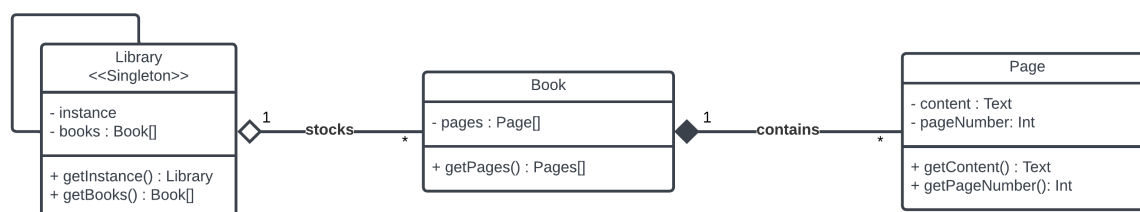
Question 6. If we were to annotate with **matrix** time stamps, how would we annotate the event marked as 'a'?

Question 7. Give one example for a happens-before relation between an event of p4 and an event of p2 using vector time stamps.

Question 8. Draw the Hasse diagram corresponding to the given diagram. You do not need to annotate them with time stamp.

Section 3: Questions carry 3 marks each. No negative marks.

Question 9. Draw a class diagram to represent the following: *Library has books. Books have pages. Each page contains text content and page number.*



Note: The relationship between library and books is aggregation. Book is composed of pages. The multiplicities are 1 to * in either case. The fields and methods are listed. Making the fields public and not having the getter is not "best practice" but acceptable for this question. Library is a singleton.

Question 10. A file system is configured to have a block size of 2048 bytes. Given that a inode of a file holds pointers to 8 direct data blocks, and a pointer to a single indirect block. Further, assume that the single indirect block can hold pointers to 4 other data blocks. What is the maximum file size that can be supported by such an inode design?

Question 11. Chunnalal configured a HDFS instance to have 1 MB sized blocks and three replicas. Pannalal configured a HDFS instance to have 256 KB sized blocks and four replicas. Considering only these factors, which instance is better tuned to save a file of size 500 KB?

Question 12. In the muddy children puzzle, as discussed in the class, what would the children say during the **second** round if $n=5$ and $k=2$? Use the following format to provide your answer.

<1st child response>,<2nd ...>,<3rd ...>,<4th ...><5th ...>

Just to remind you, in this setting, there are four children, two of them have muddy forehead and they all know before-hand that at least one of them have muddy forehead. Each child can only say 'yes', 'no' or 'dont know' secretly to the teacher in each round when their turn comes. Teacher reveals the answers to all after receiving answers from all children after every round. Children are truthful and intelligent.
