বাংলাদেশ ইউনিভার্সিটি অব প্রফেশনালস্

সেকশন/গ্রুপ..... Section-A.....		ইনভিজিলেটরের স্বাক্ষর

মোট পৃষ্ঠা সংখ্যা.....09.....টি

BSc. in CSE-17 Final Exam (Spring) Feb-21 পরীক্ষা(Examination), 20 21

বিষয় (Subj): Artificial Intelligence পত্র/কোর্স নং (Paper/Course No): CSE-403

পত্র/কোর্সের নাম (Paper/Course Name): CSE-17 কেন্দ্র (Center): MIST

রেজিঃ নম্বর (Regn No): 131401170018 শিক্ষাবর্ষ (Session): 2019-2020

রোল নম্বর (Roll No): 201714018 তারিখ (Date): 24-02-2021

INSTRUCTIONS FOR EXAMINEE

1. Examinees are forbidden to write their names either on outer cover page or anywhere of the answer scripts. In case of violation, the answer script will not be evaluated.
2. Examinees must mention their roll and registration number along with session on the outer cover page of the answer scripts clearly. Otherwise, answer scripts may not be evaluated.
3. Students will write his examination roll number on the top left corner and section-A/B on the top right corner of each page. All pages must be numbered chronologically at the bottom center in x of y format. (for example: 1 of 21)
4. In no case, an examinee will be allowed to start the examination half an hour after the commencement of examination.
5. The Camera of the examinee MUST always be ON during the examination and answer script submission. If Camera is OFF then that online examination will be treated as CANCELLED.
6. The focus of the camera should be such that the invigilator(s) can see the script and examinee with his/her surroundings.
7. Students are to share their entire screen of desktop/laptop to the invigilator throughout the online examination. .
8. Browsing any files other than the given question paper (PDF) and/or online sites other than the respective allowed examination platform (e,g Zoom, Google classroom etc.) is strictly prohibited.
9. Online invigilators reserve the right to take remote access of the examinee's desktop/laptop and investigate as needed at any point during the examination or even after the examination
10. Students without laptop/desktop cannot appear exam online by using mobile phone. Students not possessing laptop/desktop, will have to appear examination Physically at MIST.

পরীক্ষক কর্তৃক পূরণীয়

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নিরীক্ষকের স্বাক্ষর

Continued.....

INSTRUCTIONS FOR EXAMINEE

11. Examinees must abide by the instructions of chief invigilator if there are no definite instructions on any subject/matter.

12. No examinee will be allowed to leave the examination session until an hour has elapsed from the commencement of examination.

13. Legal action will be taken against the examinees those are trying to adopt/adopting unfaimeans/exibiting unbecoming conduct in the examination hall and found guilty for any breach of discipline as per rule.

14. Invigilators will have complete authority of deducting marks from any student attempting unfair means.

15. All rough works should be done in the same paper used as answer scripts. Answer scripts should be submitted intact. Papers used for rough work should be pen through by the examinees and submitted along with the answer script.

16. The answer scripts submitted beyond specified time will be treated as CANCELLED.

17. The examinee will send his/her scanned examination script in PDF format to the following e-mail addresses:

(a) e-mail address of subject invigilator/examiner.

(b) Central Database Scheme (coursecode@mist.ac.bd)
Example: EECE433@mist.ac.bd

18. The examinee has to preserve the original answer script of every examination and be ready to submit whenever asked for.

19. Answer script should be the A4 size papers with a cover page provided by Department. Examinee has to fill up his/her necessary details on the cover page. Section A and section B must be clearly marked on the cover page like. **Section A** or **Section B**

20. Examination duration for each subject will be two hours (section-A for one hour + section B for One hour). In between students will get 15 minutes time to submit the answer script of section A and 5 minutes time to issue the question for section B . After completion of 01 hour examination time for section B, students will get 15 minutes to submit the answer script of section B.

21. After completion of written examination (online/physical), viva will be conducted by the respective faculty of that subject.

Section-A

Ans. to the ques. no.-01(a)

Agent:

An agent is perceiving its environment through sensors and acting upon that environment through actuators.

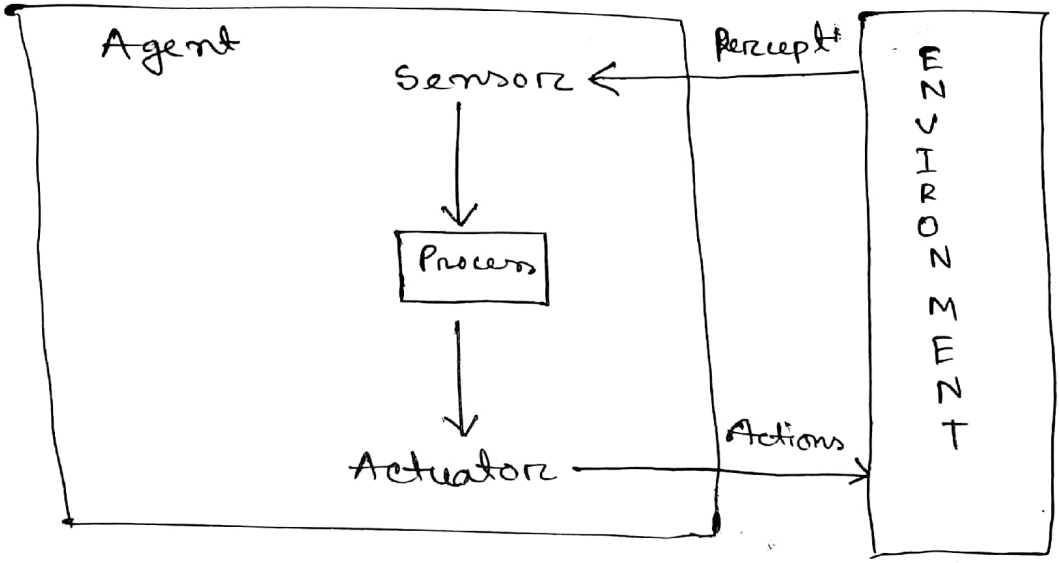


Fig: Agent.

Describing the architecture of a goal based agent:

A goal based agent needs some goal information that defines the situations that are desirable by that agent on that situation.

P.T.O.

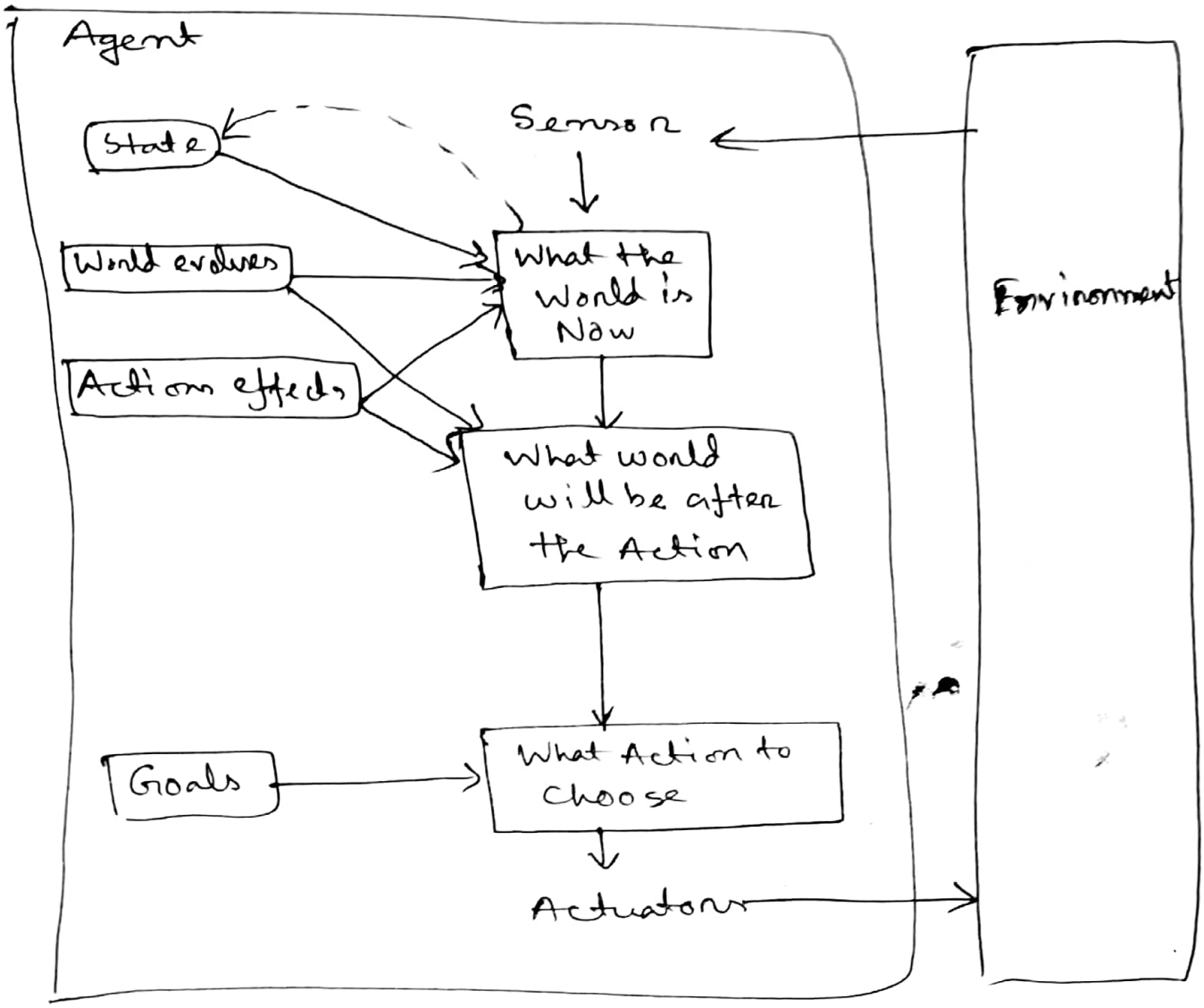


Fig: Goal-Based Agents.

Goal-Based Agents have internal state for goal information and also tracks the world/environment and the effects of each action the agent takes.

P.T.O.

Learning Agent's

Learning agent operates initially on unknown environments and becomes more competent over time and grows its initial knowledge.

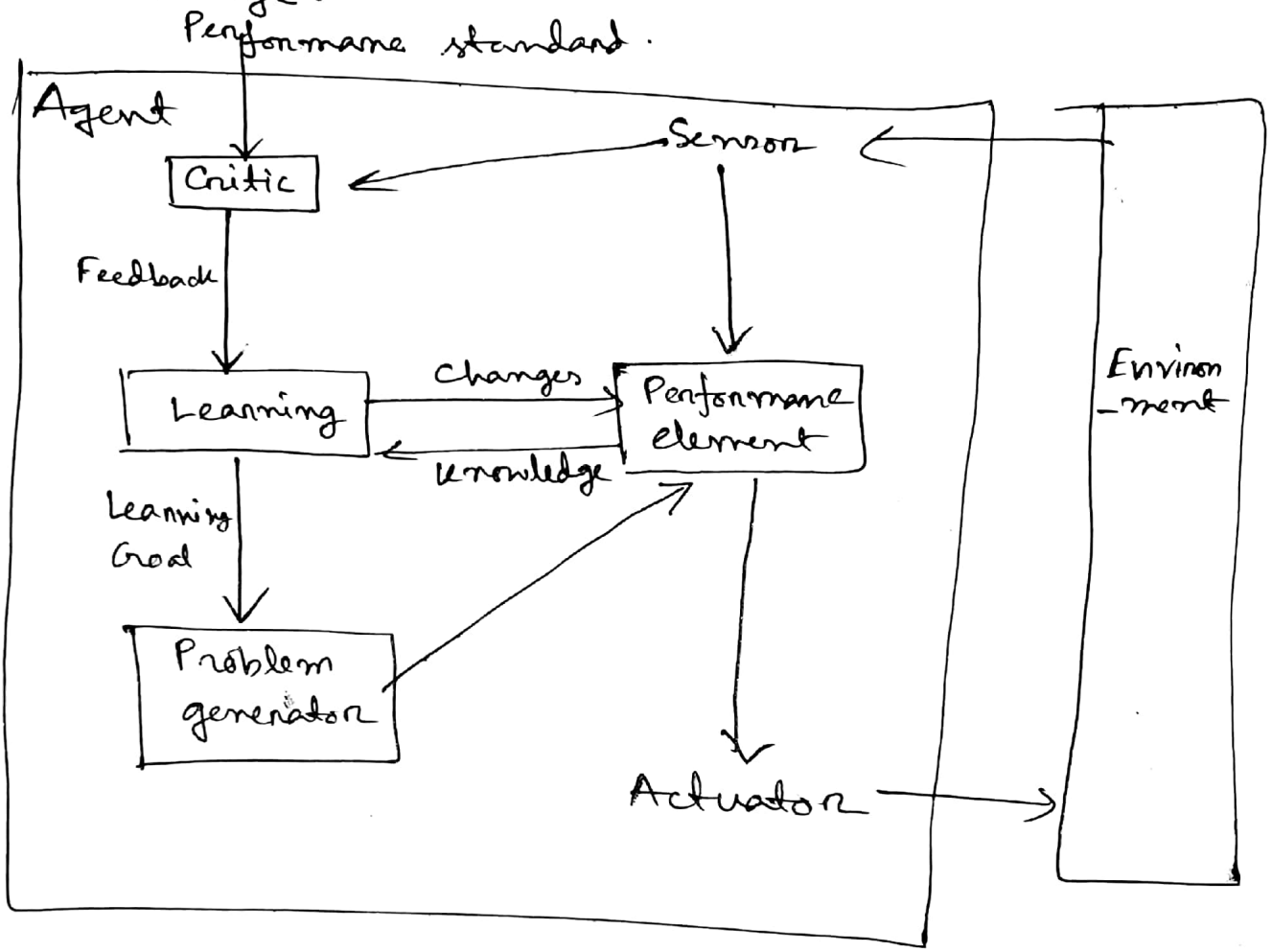


Fig: Learning Agent.

Learning agent has critic and Problem generate to adapt to new situations and to do actions on unknown situation with guide from Performance element.

Ans. to the ques. no. - 01 (b)

Start node: 'S' and End node 'E'. Using A* search algorithm:

For 'S': (A, B)

$$f(A) = g(A) + h(A)$$
$$= 1 + 5$$
$$= 6$$
$$f(B) = g(B) + h(B)$$
$$= 2 + 6$$
$$= 8$$

So, A* will choose 'A' node.

For 'A': (X, Y)

$$f(X) = g(X) + h(X)$$
$$= g(A) + 4 + 5$$
$$= 1 + 4 + 5$$
$$= 10$$
$$f(Y) = g(Y) + h(Y)$$
$$= g(A) + 7 + 8$$
$$= 1 + 7 + 8$$
$$= 16$$

So, A* will choose 'X' node.

P.T.O.

For 'X': (E)

$$f(E) = g(E) + h(E)$$
$$= g(X) + 2 + 0$$
$$= 5 + 2 + 0$$
$$= 7$$

'E' is the End node. So, A* will stop here.

So, the node sequence is:

$$S \longrightarrow A \longrightarrow X \longrightarrow E$$

So, the shortest route between 'S' and 'E' is:

$$S \longrightarrow A \longrightarrow X \longrightarrow E$$

and path cost is: (1 + 4 + 2) = 7

(Ans)

Ans. to the ques. no.-01(c)

Comparing min-max algorithm with α-β pruning algorithm below:

	min-max Algorithm	α-β pruning Algorithm
Completeness	Complete if the tree is finite.	Complete for a finite tree.
Optimality	Optimal if the opponent is optimal.	Optimal against optimal opponent.
time complexity	$O(b^m)$	$O(b^{m/2})$
space complexity	$O(bm)$	$O(bm)$

Here,

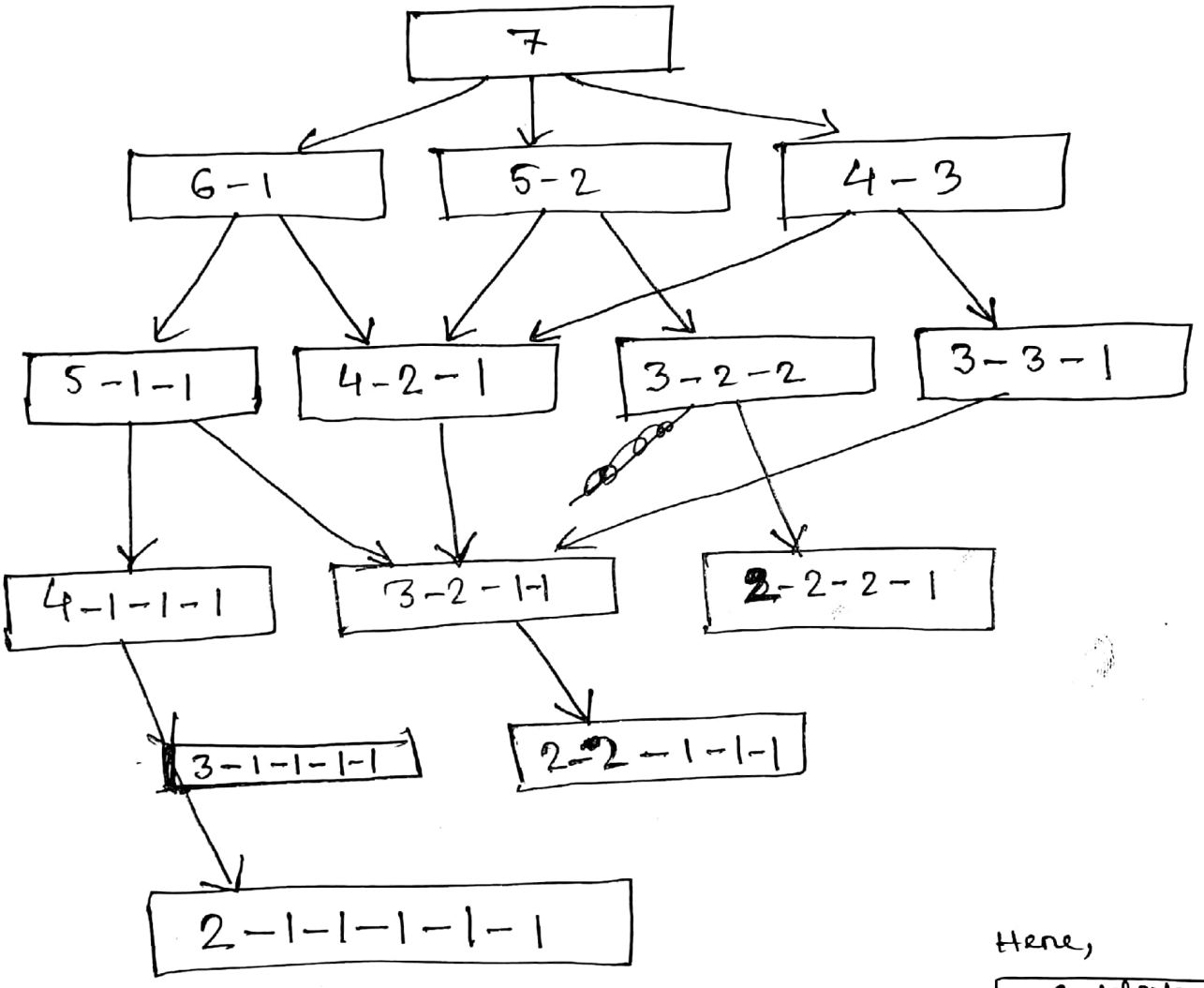
b = branching factor.

m = no. of moves by both players.

2017714018 Section-A

Ans. to the ques. no.-02(a)

Let a state [x-y] defines two states of x tokens any y tokens and similary for others as the state and then drawing the complete search tree for the Nim game:



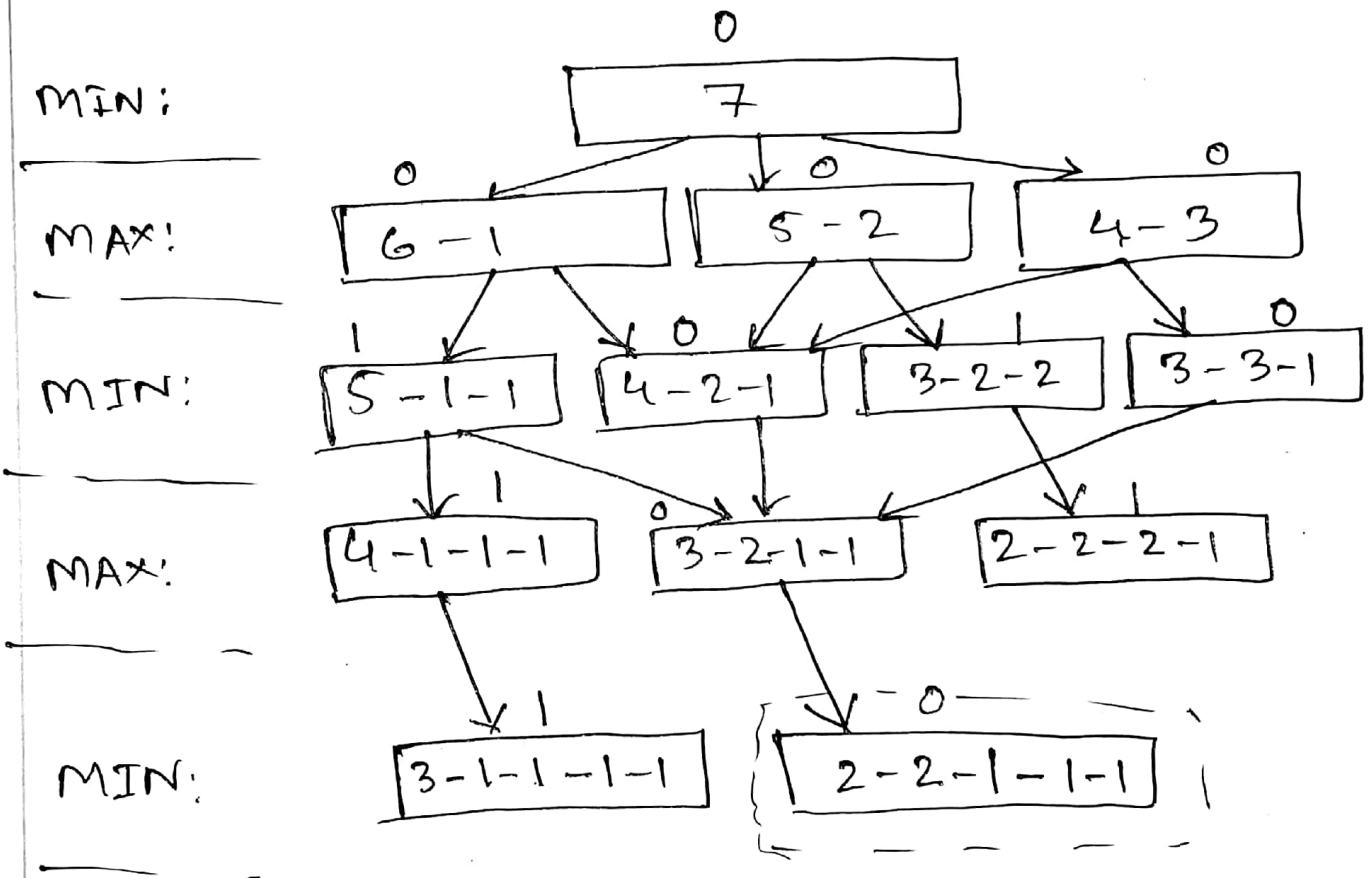
Here,
Sorted order

Fig: Search Tree for Nim Game

~~N.B: This is the third attempt and I excluded the draft pages.~~

Ans. to the ques. no.-02(b)

The strategy with min-max algorithm: min will try to minimize and max will try to maximize. So, min will always choose the min value at each step the complete path to win is given below:

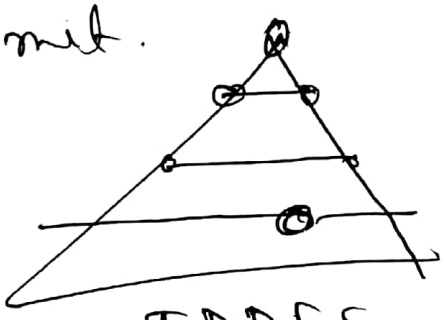


If min wins it has to come to the 3-2-1-1 state then go to 2-2-1-1-1 State to win. The superscript '0' denotes the path or nodes should pick by MIN and '1' → nodes should picked by MAX.

So, if a node has '0' min should pick that node. and if a node has '1' max should pick that node. and this is the strategy with the help of min-max algorithm that will help win the MIN player.

Ans. to the ques. no. - 02(c)

Iterative deepening search is when used the DFS but for a specific depth limit. it will give the BFS's shallow-soln advantage and DFS's space advantage.
it goes with iteration each time increasing the depth limit.



IDDFS

~~Bi~~ Bidirectional search when both from start and goal states are expanded and meet in the middle. it is optimal and comple and complexity $O(b^{d/2})$