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Course: CSE440

Section: 2

Assignment /

Quiz 3

Answer to the Question No - 1

Given, Predicates:

$\text{Parent}(p, q) \rightarrow p$ is the parent of q

$\text{Female}(p) \rightarrow p$ is a female

Constants: Fatima and Annmar

i) Fatima has a daughter (possibly more than one, and possibly sons as well):

$\exists x: \text{Parent}(\text{Fatima}, x) \wedge \text{Female}(x)$

ii) Fatima has exactly one daughter (but may have sons as well):

$\exists! x: \text{Parent}(\text{Fatima}, x) \wedge \text{Female}(x)$

iii) Fatima has exactly one child, a daughter:

$\exists! x: \text{Parent}(\text{Fatima}, x) \rightarrow \text{Female}(x)$

iv) Fatima and Annmar have exactly one child together:

$\exists! x: \text{Parent}(\text{Fatima}, x) \wedge \text{Parent}(\text{Annmar}, x)$

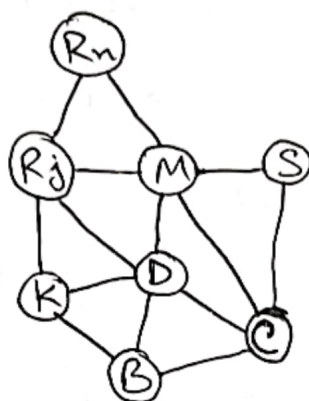
v) Fatima has at least one child with Annmar, and no children with anyone else:

$\exists! x: \text{Parent}(\text{Fatima}, x) \rightarrow \text{Parent}(\text{Annmar}, x)$

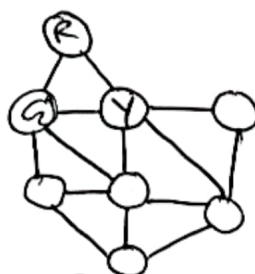
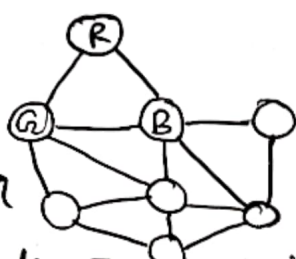
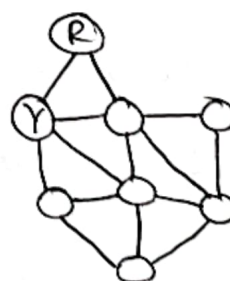
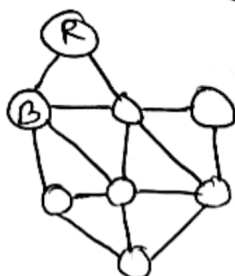
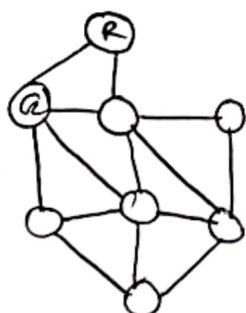
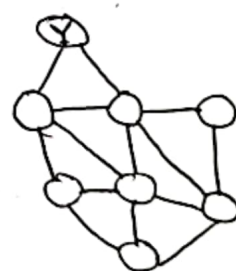
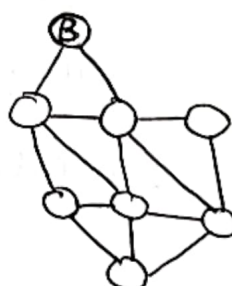
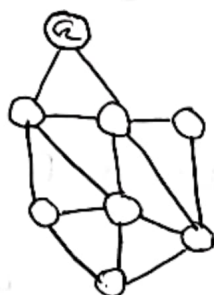
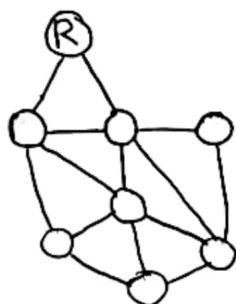
(Ans.)

Answer to the Question No-2

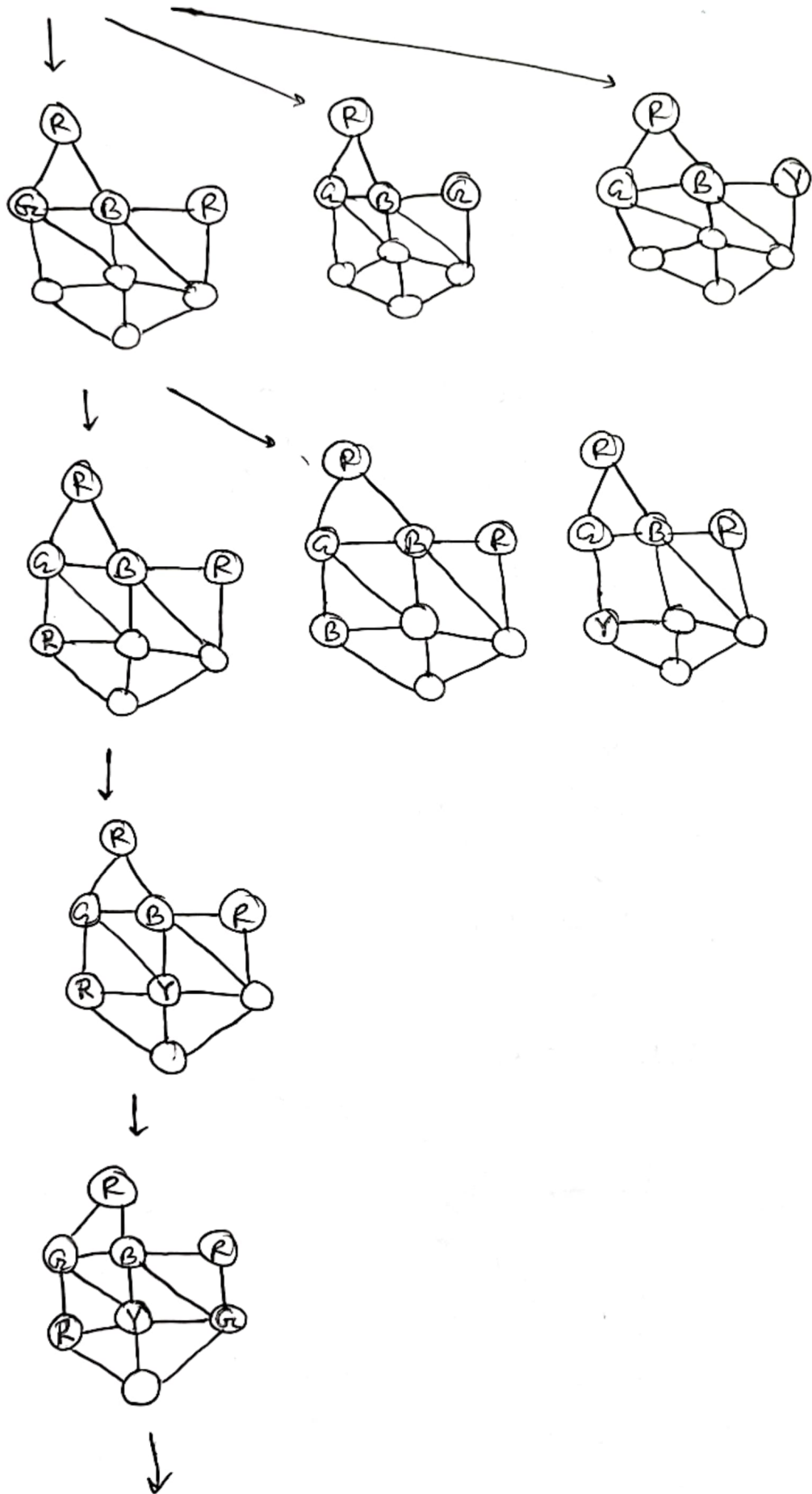
Converting the Map of Bangladesh into a graph:

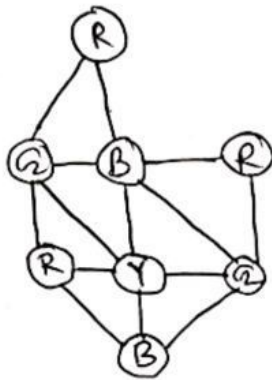


$R_n \rightarrow$ Rangpur
 $R_j \rightarrow$ Rajshahi
 $M \rightarrow$ Mymensingh
 $S \rightarrow$ Sylhet
 $D \rightarrow$ Dhaka
 $C \rightarrow$ Chittagong
 $B \rightarrow$ Barishal
 $K \rightarrow$ Khulna



[Expanding This Graph in Next Page]





So, coloring the divisions in this order will give us a fully colored graph (where no two adjacent divisions have the same color):

Rangpur \rightarrow Red

\downarrow

Rajshahi \rightarrow Green

\downarrow

Mymensingh \rightarrow Blue

\downarrow

Sylhet \rightarrow Red

\downarrow

Khulna \rightarrow Red

\downarrow

Dhaka \rightarrow Yellow

\downarrow

Chittagong \rightarrow Green

\downarrow

Barisal \rightarrow Blue

(Ans.)

Answer to the Question No - 3

☐ An infant learns to speak and understand a language through all types of learning.

An infant is taught the letters and numbers at first, and teaching the infant these is done by a supervisor which is generally their parents. So, learning in a supervised way is supervised learning. Then if the parents are showing different fruits in front of the infant saying their names day after day the infant learns just through observation, this is unsupervised learning. Now, if the infant learns that when he cries or doesn't eat his food he is scolded but when he eats his food willingly, he's praised → this learning through rewards and punishment is called reinforcement learning.

Now the way this process fits into the machine learning model is that for supervised model a machine is given a lots of data

i.e. pictures of animals the machine learns to differentiate from ^{seeing} all these data just by identifying the different features. Then just like an infant learns by hearing and watching, the machine can also learn through different sensors like camera, mic and by observing through sensors it can learn which is unsupervised learning. Then the machine can create models by differentiating the features that can be used to identify new objects just like an infant identifying a cat even if it's from a different breed. And that's how by various features and patterns an infant learns just like a machine and that's how it fits into the machine learning model.

Answer to the Question No - 4

☐ One of the most classic problems in Dhaka city that can be solved using AI/Machine learning is traffic management. To solve the problem the data can be collected through real-time traffic data such as ^{the} number of vehicles on the road, the speed they're running at, traffic signals at different points and how that is reacting with the congestion etc., and fed into an AI/Machine learning algorithm. The algorithm then will predict the traffic patterns and suggest what signals should be given where so that it optimizes the traffic flow and minimize the traffic congestion as much as possible. The algorithm can be

The algorithm can be tested by running different traffic situations simulations and then compared with the real world data. After reaching a decent performance phase the algorithm can be released through an app or ~~an~~ a website and

different sensors like camera, speedometer should be installed and connected to the AI/Machine learning system.

The challenges this idea might face are like having low real-time traffic data and not being able to predict the sudden congestions caused by the traffic. Then this ~~ats~~ data also needs to be updated regularly to predict things correctly and also needs to be trained using a large data because the traffic in Dhaka is very large and thus making it harder to predict accurately. Though this is something similar to Google Maps but if it can be implemented in Dhaka by the traffic department it'll optimize the traffic flow at a huge rate.