CS pathshala
Bringing computational thinking to schools

Overall goal of the lesson	Iterative Patterns and processes
Prior knowledge required	Patterns and processes

MODULE 1:   **Module time:** 35 minutes

Goal:	Regular Expressions – revisiting expressions to capture day to day activities, different ways of creating expressions
Description:	Revisiting expressions - laying the idea of a language of expressions (one may be motivated by regular languages here), expressions to capture a repetitive day-to-day life activity; different ways of creating the expressions that have the same meaning
Material required:	**Physical: None** **Electronic: None**
Procedure Summary:	
Procedure Details:	Start the session with stating the agenda for today and recalling the Iterative patterns and processes learnt earlier ex. "We learnt about Iterative processes in the earlier classes. Today we will learn about regular expressions" Slide 2: Start with the above context setting and recollect the examples used in the earlier session. Then tell them that today we will learn about Regular expressions and before that we will see some examples on why we need to learn regular expressions. Slide 3,4,5 and 6: ● The slides are quite self-explanatory. ● Don't start with defining regular expressions. Just explain the scenario and let the students appreciate the need for Regular expressions. ● Make sure that the students understand the problem statement/scenario correctly ● You can make it more interactive. Just put the problem statement and ask the students how they will solve it. Based on their response, tell them that these problems can be easily solved using Regular expressions and we will learn more about it in coming slides Slide 7 : ● Explain with the help of the slide, how they will do the above activities manually. Then explain them that such activities can be done much faster by using "Regular Expressions" and hence it is very important to learn that. ● Also emphasize that Regular Expressions will be called as RegEx in the discussions going forward.

Slide 8 :
- In slide 8, we give a small text paragraph and introduce RegEx to use for searching text.

Slide 9 and 10:
- Show slide 9. You can ask the students to search for words which contain alphabet "f".
- If they have to search the words manually, they will go through the paragraph, line by line and check each word for the occurrence of 'f'
- If the computer is asked to search for words containing "f", the computer will use the RegEx "f"
- The RegEx "f" tells the computer to search for words with "f"
- Show the result on slide 10 and confirm with the students

Slide 12 :
- Before showing slide 12, ask the students to write a RegEx for searching words which contain alphabet "h".
- Then explain the example with the help of slide 12

Slide 13 and 14:
- Use slide 13 to check the progress. Ask questions to the students and check if they are understanding the concept.
- Now ask them what will the RegEx "ha" search?
- Verify their answers – The RegEx "ha" wills search for words containing "ha"
- Show slide 14 to verify the results
- Emphasize how the RegEx "ha" narrowed down the search criterion.
- You may choose different examples of RegEx to search and practice for the students Ex. RegEx "th", "la", "li" etc.

Slide 15 :
- Generate excitement amongst the students and ask them how they can further narrow down the search.
- RegEx "had" – ask the students what will be the result
- Verify the response from the students by showing them slide 15.

Slide 16 :
- Use slide 16 to further practice RegEx
- RegEx "he" – will return all words containing "he"
- Verify the results with the help of slide 16
- Point out that the search will not list "He"
- Ask the students why? Verify their responses.
- Then remind them that RegEx are case sensitive – they treat capital and small alphabets differently.
- So "he" and "He" and 2 different RegEx
- Take few other examples from the paragraph and reiterate the concept as it is very important. Ex. "TH", "th", Th" etc. All 3 are different RegEx.

Slide 17, 18, 19 :
- Ask the students if they have started to understand RegEx. Show them slide 17 and explain the scenario. Maths test is conducted in the class and the result sheet looks like shown in the slide.

	- Few students have scored a perfect "50". How to find out the students who have scored a perfect score using RegEx? - Here the RegEx will use numbers - RegEx "50" – will return all the students who have scored 50 marks - Verify the results with the help of slide 19. Slide 20, 21, 22: - Use slide 20 to explain the scenario. - Here the task is to search all numbers in the given paragraph. We know that numbers can be from 0 to 9. So whenever we want to search for a range of things we use square brackets – [and]. - The RegEx – "[0-9]" will search for the occurrences of numbers in a given text - Verify the results with the slide 21 - Practice the range concept by changing the RegEx to – [5-9], [0-4] etc. - Tell the students that range can be given for numbers as well as characters. - Explain this with RegEx – [b-d]. This regular expression will search for all characters between b and d - Verify the results with the help of slide 22 Slide 23: - Before showing slide 23 to students, write few words on the board – Gray/Grey, License/Licence, Organization/Organisation. - How will we search for words which can be spelt in multiple ways like shown above? - How to write RegEx for such scenarios? - The way to write RegEx for such words is to put the characters which can change in square brackets eg. Gr[ea]y will search for both Grey and Gray. - Similarly explain the other words with examples. Slide 24, 25, 26 and 27: - On slide 24, I have written names of few of my friends. - I have many friends with names starting with A - I need to make a list of all names starting with A - The RegEx A* - is used to list all names starting with A, followed by 0 or more characters. The * in the RegEx tells the computer to search for all names starting with A and followed by 1 or more alphabets - On slide 26, RegEx Ak+ is used to search for all names starting with Ak and followed by 1 or more characters - Show slide 27 to verify the results Slide 28: - Slide 28 is the summary slide. - Reinforce the points mentioned on this slide
Assessment:	At the end of this lesson, given a scenario, the students should be able to write down the simple Regular expressions. Also given a Regular expression, students should be able to tell the result of that expression.
Information Broadcast:	

Note : The teacher may use their discretion for slight deviations in the examples

Question No	Model Answer
1	The RegEx is "p". The words searched are: Result of RegEx : Rabindranath Tagore **w**as born in Calcutta in 1861. He is the **p**oet **w**ho **w**rote India's national anthem, and he **w**on a Nobel Prize in Literature in 1913. Tagore started to **w**rite **p**oetry **w**hen he **w**as only eight years old and he **p**ublished his first **p**oems **w**hen he **w**as only sixteen. For this first names, Tagore did not use his real name. He used a "**p**en name". His **p**en name, in English, meant "Sun Lion".
2	RegEx to search all numbers from the paragraph : [0-9] Result of RegEx – Rabindranath Tagore **w**as born in Calcutta in **1861**. He is the poet **w**ho **w**rote India's national anthem, and he **w**on a Nobel Prize in Literature in **1913**. Tagore started to **w**rite poetry **w**hen he **w**as only eight years old and he published his first poems **w**hen he **w**as only sixteen. For this first names, Tagore did not use his real name. He used a "pen name". His pen name, in English, meant "Sun Lion". RegEx to search for between 1 and 6 : [1-6] Result of RegEx – Rabindranath Tagore **w**as born in Calcutta in **186**1. He is the poet **w**ho **w**rote India's national anthem, and he **w**on a Nobel Prize in Literature in 19**13**. Tagore started to **w**rite poetry **w**hen he **w**as only eight years old and he published his first poems **w**hen he **w**as only sixteen. For this first names, Tagore did not use his real name. He used a "pen name". His pen name, in English, meant "Sun Lion".
3	Result of RegEx "w" - Rabindranath Tagore **w**as born in Calcutta in 1861. He is the poet **w**ho **w**rote India's national anthem, and he **w**on a Nobel Prize in Literature in 1913. Tagore started to **w**rite poetry **w**hen he **w**as only eight years old and he published his first poems **w**hen he **w**as only sixteen. For this first names, Tagore did not use his real name. He used a "pen name". His pen name, in English, meant "Sun Lion". Result of RegEx "W" – No words (since there is no occurrence of "W" in the above paragraph.
4	RegEx – "wh" Result of RegEx - Rabindranath Tagore was born in Calcutta in 1861. He is the poet **wh**o wrote India's national anthem, and he won a Nobel Prize in Literature in 1913. Tagore started to write poetry **wh**en he was only eight years old and he published his first poems **wh**en he was only sixteen. For this first names, Tagore did not use his real name. He used a "pen name". His pen name, in English, meant "Sun Lion".