Q. Write a report on your understanding of Rendering and Design Patterns.

By Rendering, what I understood about it is that it is the process of generating a visual representation from a given set of instructions. It can be thought of as a way to simplify and modify the User Interface to make it look more appealing. Rendering is used to display GUI, web pages, or images based on input. It involves converting abstract data into a format that can be displayed onto the screen. Server Side Rendering, Client Side Rendering, Static Rendering , etc. are different types of rendering patterns available. n server-side rendering, the server prepares the website and sends it to the client. In client-side rendering, the client's device processes the website's code to build and display the site.

On the other hand, Design patterns can be seen as reusable solutions to common problems that arise during software design and development. They can be thought of as templates to common coding problems. They provide a way to organize code, making it more maintainable, scalable, and easier to understand. Thus, making easy the coding of solutions for common problems. They are used to eliminate the process of reworking on the logic of common coding issues of designing a particular page or app. Design patterns are not specific to a particular language. Thus they can be used along with any of the languages to implement the logic. There are several design patterns like Creational Patterns, Structural Patterns and Behavioral Patterns.

Creational Patterns are desgin patterns that focus more on creation process of object, thus providing all the information about the object such as its logic, abstraction, encapsulation, etc. Most commonly used creational pattern is Singleton pattern which ensures that the class has only one instance,i.e. only one object.

Structural Patterns are patterns that deal with assembling and organizing classes and objects into more larger structures. They focus on simplifying the relationship between objects and classes. Most commonly used structural pattern is Decorator pattern which involves usage of wrapper.

Behavioral Patterns are design patterns that focus mainly on behavior of the objects and classes. It is mostly related to the communication between various objects and classes that exists. Most Common example of behavioral pattern is Observer pattern which notifies other objects that a certain event has occured in the respective object where it is present.

Thus, Rendering patterns and Design patterns both are conceptually easy and useful terms in Computer Science and Information Technology Industry. Thus making learning them useful for the industry person.

Q. Mention and elaborate where a particular Rendering pattern is applicable and is well suited for which use case.

Consider Client Side Rendering Pattern. It basically means that the website will be build on the client's side or client's pc by transferring the code from server to respective client and then processing. Client Side Rendering Pattern has various applications, some of them are :

1) Web Games even the Dino game must've used same pattern (Dragon game by Google that we play when there's no internet connectivity).
2) Dynamic Web Applications that react as per client clicks on the content.
3) Ecommerce Websites: The website get modified as per the client requests and thus is assembled at client side. For instance adding items to cart, wishlist, comparing items, etc. makes the website modify itself and thus I can say it uses the client-side rendering pattern.

Consider Server Side Rendering Pattern. Inversely to the Client Side Rendering pattern, it means that the website or application will be delivered to the client's pc as a single assembled code/program, which is assembled on server only. Some of applications of server side rendering are:

1) Ecommerce Websites: The Data of items like product lists, checkout of items of the client is done at the server side.
2) Search Engines: Google, Yahoo, etc. makes use of server side rendering to search through the internet effectively.

Use case of Web Games:

For Web Games to run effectively with full efficiency, Client Side Rendering Pattern is to be used. As this will help the user interact with the website/ web game and thus give him a priority over other tasks. This pattern makes loading of website more faster compared to Server Side Rendering. As the User interaction is faster and improved, the user will feel satisfied that he's actually the one who is operating the game and that his decisions actually matter in the gameplay.

For instance in the Dino game by Google, if client side rendering is not used, the user won't get the feeling of operating the game and the game won't react dynamically to the user decisions thus making the game less effective as the customer satisfaction factor isn't fulfilled. Client-side rendering allows the game to react quickly to user input, providing an engaging and responsive experience. If you decide to use server side rendering in this case then the game would feel as if the user decisions don't matter at all as the game is slowed down due to loading of the game and thus making the game useless as user interaction gets more latency.