MODULE 1 QB

-PP

1) What is RPA? List some of the tasks that can be performed by RPA bots.

Ans) RPA (Robotic Process Automation) is the technology that enables software 'robots' to carry out repetitive, rule-based digital tasks.

RPA involves bots that perform a set of specified actions or tasks, such as the following:

- The cut-and-paste of information from one app to another
- The opening of a web site and login
- The opening of an e-mail and attachments
- The read/write of a database
- The extraction of content from forms or documents
- The use of calculations and workflows

2) List and Explain the Flavors of RPA.

Ans)

Some of the flavors of RPA are:

1) Attended RPA

2) Unattended RPA

3) Intelligent Process Automation (IPA)

1) Attended RPA:

- Referred as robotic desktop automation or RDA.
- This was the first generation of RPA that was emerged back in 2003 or so.
- Attended RPA means that the software provides collaboration with a person for certain tasks.
- Ex: In the call center, where a representative can have the RPA system to handle all the information while he or she talks to a customer.

2. Unattended RPA:

- This was the second generation of RPA.
- We can automate a process without the need for human involvement.
- The bot is triggered when certain events happen.
- Ex: When a customer e-mails an invoice.
- This flavor is generally used for back-office functions.

3. Intelligent process automation (IPA):

- Referred as cognitive RPA.
- This is the latest generation of RPA technology.
- Less human involvement.
- RPA software uses its own insights and judgements to make decisions.
- AI allows the system to learn over the time.
- Ex: Interpretation of documents.

3) Write a note on the History of RPA.

Ans)

- There have been different periods of automation, based on the types of technologies available.
- There also provided with a foundation for RPA platforms.

1. Mainframe Era:

- These were huge machines developed by companies like IBM.
- They were expensive and mostly available to large companies.
- They were incredibly useful in managing core functions of the companies.

2. PC Revolution:

- Intel's development of the microprocessor and Microsoft's development of its operating system revolutionized the technology industry.
- As a result, any business could automate processes, say by using word processors and spreadsheets.

- The key elements for RPA came about in the early 2000s.
- Around 2012, the RPA market hit an inflection point.
- Companies were looking for ways to lower their costs.
- Companies also realized they had to find ways not to be disrupted from technology companies.
- RPA was considered an easier and more cost-effective way to go digital.
- Some industries like banking were becoming more subject to regulation.
- RPA technology was starting to get more sophisticated and easier to use, allowing for higher ROI (return on investment).
- Large companies were starting to use RPA for mission-critical applications.
- Demographics were also the key.
- As the millennials started to enter the workforce, they wanted careers, not jobs.
- By 2023, the forecast is that there will be $12 billion spent on RPA services.

4) List and explain the benefits of RPA.

Ans)

1. Higher quality services, greater accuracy
2. Improved analytics
3. Reduced costs
4. Increased speed
5. Greater compliance
6. Agility
7. Comprehensive insights
8. Versatility
9. Simplicity
10. Scalability
11. Time savings
12. Increased employee satisfaction

1. Higher quality services, greater accuracy:

- With reduced human error and greater compliance, the quality of work is much better.

2. Improved analytics:

- Actions performed from software robots makes it very easy to get business insights and other analytical data.
- Using analytics on the collected data, predictions can be made and tasks can be completed on time.

3. Reduced costs:

- It is commonly heard that one Robot is equivalent to three human full-time executives (FTE).
- This is based on the simple fact that one FTE works for eight hours a day, while a Robot can work for 24 hours without a break.
- Therefore, the cost of operations is reduced tremendously.
- The speed of the work being performed coupled with multitasking, results in further reductions of cost.

4. Increased speed:

- Robots are very fast in completing their work.

- Increased speed can result in better response times.
- Increased speed can result in completion of large volume of the tasks.

5. Greater compliance:

- A full audit trail is one of the highlights of RPA and can result in greater compliance.
- These Robots do not deviate from the defined set of steps to be taken while doing a task.
- Hence it will certainly result in better results.

6. Agility:

- More Robots can be deployed to perform the same task easily.
- This is just a click away.
- It does not require any kind of coding or reconfiguration.

7. Comprehensive insights:

- Robots can tag transactions to use them later, in reports for business insight.
- By using them, better decisions can be made for the improvement of the business.

8. Versatility:

- RPA is applicable across industries performing tasks ranging from small to large businesses, simple to complex processes.

9. Simplicity:

- RPA does not need prior programming knowledge.
- Most platforms provide designs in the form of flowcharts.
- Hence it is easy to carry out higher value work.

10. Scalability:

- RPA is highly scalable, up as well as down.
- Robots can be quickly deployed at zero or minimum costs while maintaining consistency in the quality of work.

11. Time savings:

- Robots help in saving time.
- A technology upgrade is much easier and faster to adapt to the changes.
- This can be done by bringing about modifications in the programming or introducing new processes.
- For humans, it is difficult for them to learn and get trained in something new.

12. Increased employee satisfaction:

- RPA frees humans from tedious, mind-numbing work.
- It gives us an opportunity to engage in much more satisfying jobs.

5) List and explain the downsides/drawbacks of RPA.

Ans)

1. Long-term sustainability
2. Implementation
3. Error magnification
4. Overall risk
5. Maintenance

1. Long-term sustainability:

- RPA can become a serious decoy from the necessary long-term work needed to make processes and administrative work more efficient.
- There is a risk that you may focus on quick fixes rather than doing things correctly from the start.

2. Implementation:

- RPA might give you good value in stand-alone tasks, but it takes time and money to set up.
- It's a bad idea to cut corners on RPA because it might lead to errors.
- We should know that almost half of all RPA systems fail when first rolled out.
- So the implementation might take more resources than you initially thought.

3. Error magnification:

- RPA robots can't detect some obvious errors that a human would be able to immediately point out.
- If your data has problems with it, RPA robots will not call it out, but pass it on, which may be a problem later on.

4. Overall risk:

- Some problems aren't a good fit for RPA, especially when the stakes are high.
- For example, if you need to handle your purchase invoices, it's likely a better idea to use software that is able to understand and manage the data correctly from the start.

5. Maintenance:

- Most RPA solutions have to be custom-made to fit your business.
- It likely won't be worth it to invest in such a system if the way your business runs could change drastically in the future.
- Even minor changes in your setup can create problems for your RPA robots.

6) Write the note of the following:

a. RPA compared with BPM

Ans)

- BPM – Business Process Management
- With the intense competition from Japan during the 1970s and 1980s, US companies were desperately seeking new and innovative approaches to improve their efficiency and competitiveness.
- Part of this meant adopting different management approaches, such as Six Sigma (based on combination of project management and statistical techniques), lean production (based on the manufacturing principles of Toyota) and total quality management or TQM (a blend of Six Sigma and lean production).
- There was also a greater focus on computer technologies.
- For example, FileNet introduced a digital workflow management system for better handling of documents.
- Then there would come onto the scene ERP vendors, such as PeopleSoft.
- All of this would converge into a major wave called BPM.
- BPM is about changing extensive processes, not tasks.
- There also needs to be detailed documentation and training.
- BPM is often attractive to industries that are heavily regulated, such as financial services and healthcare.
- However, the risk is that there may be too much structures, which can be a problem for innovation and agility.
- On the other hand, RPA can be complementary to BPM.
- That is, you can first undergo a BPM implementation to greatly improve core processes.
- Then you can look to RPA to fill in the gaps.

b. RPA compared with BPO

Ans) This is when a company outsources a business service function like payroll, customer support, procurement and HR.

BPO – Business Process Outsourcing

A BPO will have three types of strategies:

a) Offshore:

- This is where the employees are in another country, usually far away.

b) Nearshore:

- This is when the BPO is in a neighboring country.
- True, there are usually higher costs but there is the benefit of being able to visit the vendor conveniently.
- This can greatly help with the collaboration.

c) Onshore:

- The vendor is in the same country.
- For example, there can be wide differences in wages in the United States.
- This is a drawback with BPO.
- Yet there are some other things to consider:

a) Security:

- If a BPO company developing an app with your company's data, are there enough precautions in place so there is not a breach?
- Even if so, it can still be difficult to enforce and manage.

b) Costs:

- Over the years, countries like China and India have seen rising labor costs.
- This has resulted in companies moving to other locations, which can be disruptive and expensive.

c) Politics:

- This can be a wildcard.
- Instability can easily abandon a BPO operator in a particular country.

c. RPA compared with BPA

Ans)

- BPA – Business Process Automation
- This is the use of technology to automate a complete process.
- One common use case is on-boarding.
- For example, bringing on a new employee involves many steps, which are repeatable and needs lots of paperwork.
- For a large organization, the process can be time consuming and expensive.
- But BPA can streamline everything.
- RPA is really about automating a part of the process, whereas BPA will take on all the steps.

7) Explain On-Premise Technology.

Ans) The traditional IT system approach is the use of on-premise technology.

- This means that a company purchases and sets up its own hardware and software in its own data center.

- Some of the benefits include:
  1. A company has complete control over everything.
  2. This is particularly important for regulated industries that require high levels of security and privacy.
  3. Better ability to customize the solution to your company's unique needs and IT policies.

- However, it has serious issues as well, like:
  1. One of the biggest issue is the cost, which often includes capital expenses.
  2. Ongoing need for maintenance, upgrades and monitoring.
  3. IT department may be spending valuable time on noncore activities.

- Because of all these, companies have been looking for another approach - that is, cloud computing.
- But the Internet was still fairly used and not in wide-spread use in 1980's.
- With PCs, a company wanted to network them together to enable collaboration and sharing of data and other resources.
- But as the Internet became more robust, there was a move to so called cloud computing.

8) Explain Cloud Computing along with its drawbacks.

Ans)

The use of On-premise technology had serious issues like:

1. One of the biggest is the cost, which often included capital expenses.
2. Ongoing need for maintenance, upgrades, and monitoring.
3. IT department may be spending valuable time on noncore activities.

- Because of all this, companies have been looking at another approach – that is, cloud computing.
- But the Internet was still fairly used and not in wide-spread use.
- Thus, with PCs, a company could network them together to enable collaboration and sharing of data and other resources.
- But as the Internet became more robust, there was a move to so called cloud computing.
- One of the first business applications in this industry was developed by Salesforce.com.
- It made possible for users to use the software through a browser.
- Software-as-a-Service was used.
- Services were delivered to the people immediately via the Internet, in the cloud.

The cloud software had downsides/drawbacks as well:

1. With less control of the platform, there are more problems in security and privacy lapses.
2. Failure in power supply do happen and can be extremely disruptive and costly for enterprises that need reliability.
3. Cloud computing is not necessarily cheap. In fact, one of the biggest complaints against Salesforce.com is the cost.

9) Explain the different Cloud Computing approaches.

Ans) The different Cloud Computing approaches are:

1. Public Cloud
2. Private Cloud
3. Hybrid Cloud

Public Cloud:

- The cloud is accessed from remote servers, such as from AWS, Salesforce.com, and Microsoft.

- The servers have an architecture known as multitenant that allows the users to share a large IT infrastructure in a secure manner.
- This greatly helps to achieve economies of scale, which would not be possible if a company created its own cloud.

Private Cloud:

- This is when a company owns the data center.
- There are no benefits of the economies of scale from a public cloud. But this may not be a key consideration.
- Some companies might want a private cloud because of control and security.

Hybrid Cloud:

- This is a blend of the public and private clouds.
- For example, the public cloud may handle less mission-critical functions.

10) Explain Programming Language and Low Code.

Ans)

Programming Language:

- A programming language allows you to instruct a computer to take actions.
- The commands generally use ordinary words like If, Do, While and Then.
- But there can still be lots of complexity, especially with languages that use advanced concepts like object-oriented programming.
- Some of the most popular languages today include Python, Java, C++, C# and Ruby.

Low Code:

- To use an RPA system, you have to use some code – but it's not particularly difficult.
- It's actually known as low code.
- As the name implies, it is about using minimal manual input.
- For example, an RPA system has tools like drag-and-drop and visualizations to create a bot.
- This does not imply that you don't need some training.
- To do low code correctly, you will need to understand certain types of workflows and approaches.

11) Write a short note on the following:

a) Databases:

Ans)

- At the heart of most applications is a database, which stores data that can be searched and updated.
- This is usually done by putting the information in tables (rows and columns of information).
- The dominant form is the relational database (developed in 1970) that uses structured data.
- To interact with this, there is a scripting language called SQL (Structured Query Language), which was relatively easy to learn.
- While relational databases proved to be quite effective, there were still some nagging issues.
- Perhaps the biggest was data sprawl.
- This describes when there is a number of tables increasing rapidly across the organization.
- This often makes it extremely difficult to centralize the data, which can make it challenging to get a whole view.
- Another problem was that relational databases were not cheap.

- As new technologies came on the scene, such as cloud computing and real-time mobile applications, it became more difficult to process the data.
- Initially, Yahoo! was used to handle the Big Data demands from its massive digital platforms.
- Then other major companies, like Facebook and Twitter, adopted Hadoop.
- In the meantime, there have been new approaches that have gone against the model for relational databases.
- They include offerings like MySQL and PostgreSQL.
- There is likely to be much innovation with database technology in nearby future.
- Yet relational databases will remain the majority of what companies use - which means that this will also be what RPA interacts with as well.

b) OCR:

Ans)

- A key feature for an RPA platform is OCR.
- OCR - Optical Character Recognition.
- It has two parts:
  1) A document scanner
  2) A software that recognizes text.

- In other words, with OCR, you can scan an image, PDF, or even handwritten documents – and the text will be recognized.
- This makes it possible to manipulate the text, such as by transferring it onto a form or updating a database.
- Even though RPA systems may have their own OCR, this may not necessarily be enough.
- Some industries and segments, such as healthcare, insurance, government and banking, still rely heavily on handwritten forms - all of which can be time-consuming and costly.
- But there are OCR systems that can help out, such as HyperScience.
- This software uses machine learning (ML) technology to quickly and accurately extract the information.

c) API:

Ans)

- API – Application programming interface.
- It is the software that connects two applications.
- For example, let's say you want to create a weather app. To get access to the data, you can setup an API, which often is fairly straightforward, such as by putting together a few lines of code to make data requests (say, for the city).
- By doing this, you will increase the speed of the development.
- APIs are very effective.
- They also have different structures.
- Although, the most common is a REST (representational state transfer) API.
- It's true that APIs can be used as a form of automation.
- API has few issues as well:
  1) Metering, which means that you may be limited to a certain number of requests per day or hour.
  2) There may be higher pricing.
  3) APIs can have bugs and glitches, especially in complex IT environments.
- Because of these difficulties, RPA has proven to be a very attractive alternative.

d) Web technology:

Ans)

- It involves the use of hyperlinks to navigate web pages.
- HTML or hypertext markup language is used.
- It consists of a set of commands and tags to display text, show colors and present graphics.
- HTML is easy to learn and use, which helps to accelerate the number of web sites.
- For example, many of the commands in HTML involve surrounding content with tags, such as the following:

```
<strong>This is a Title</strong>
```

- This means that the text is bold.
- It also included CSS (Cascading Style Sheets) and JavaScript.
- No doubt, RPA must deal with such systems to work effectively.
- This means it will have to take actions like identify the commands and tags so as to automate tasks.

12) Explain the issues in Artificial Intelligence.

Ans)

1) Bias:

- A real-world example of this is Amazon.com.
- The problem was it kept on selecting male candidates while recruiting.
- Amazon.com did change the system and the results did not change much.
- The inherent problem was that much of the data – which was based on incoming resumes – were from males.
- In other words, AI turned out to be the wrong approach.
- The good news is that Amazon.com recognized this and abandoned the project.

2) Causation:

- Humans have a strong grasp of this. We know what will happen if we use a hammer to hit a glass.
- It's pretty much instinctive.
- But this is not the same with AI.
- And thus is a major limiting factor.

3) Common Sense:

- A human does not have to process many cases to understand certain rules of thumb.
- We just naturally understand them.
- But with AI, common sense has been extremely difficult to code because of the ambiguity and the lack of useful data for the infinite use cases.

4) Black Box:

- It can be nearly impossible for a person to understand why the model is generating certain results.
- True, this may not be a problem with facial recognition.
- But with applications in regulated industries, it could mean that deep learning is not viable.

5) Comprehension:

- An AI system cannot truly understand what it is reading or observing.
- For example, if it read War and Peace, it would not be able to provide thoughts on the character development, themes, and so on.

6) Static:

- So far, deep learning has been mostly useful with constrained environments, such as with board games.
- But the real world is much more dynamic and open-ended.

7) Conceptual Thinking:

- AI cannot understand abstract ideas like justice, misery, or happiness.
- There is also a lack of imagination and creativity.

8) Brain:

- It's really a miracle of evolution.
- A typical brain has 86 billion neurons and trillions of synapses.
- And it only needs 50 watts a day to run.
- Modern computers can come nowhere matching this power.

13) Write a short note on

1) Machine Learning

Ans)

- This is where a computer can learn and improve by processing data without having to be explicitly programmed.
- ML is one of the oldest forms of AI and uses traditional statistical methods.
- Methods include k-nearest neighbor (k-NN) and the Naive Bayes classifier.

2) Deep Learning

Ans)

- Deep learning is about using so-called neural networks.
- Neural networks such as recurrent neural networks (RNNs), convolutional neural networks (CNNs) and generative adversarial networks (GANs).
- It finds patterns that humans often cannot detect.

3) NLP

Ans)

- NLP - Natural Language Processing
- This is AI that helps understand conversations.
- The most notable examples of this include Siri, Cortana and Alexa.
- But there are also many chatbots that focus on specific uses cases (say, with providing medical advice).

14) Write a short note on

1) Types of data.

Ans)

There are two main types of data:

1) Structured Data:

- This is data that is formatted that can be stored in a relational database or spreadsheet.
- Ex: Social security numbers, addresses, point of sale information, etc.

2) Unstructured Data:

- This is data that is unformatted.
- Ex: Images, videos, voicemails, PDFs, emails, and audio files.

2) Cognitive Automation

Ans)

- It's often confused with AI – but the two concepts have different meanings.
- Consider cognitive automation to be an application of AI, actually.
- First of all, it is mostly focused on automation of the workplace or processes in business.
- Next, it uses a combination of technologies like speech recognition and NLP.
- By doing this, the goal is to replicate human actions as best as possible, such as by analysing patterns of workers and then finding patterns and correlations.
- Cognitive automation is usually effective with the use of much less data.
- They do not depend much on technical talent, such as data scientists.

3) Agile, Scrum, Kanban, and Waterfall

Ans)

Agile:

- Created back in the 1990s.
- Focus was to allow for incremental and iterative development, which begins with a detailed plan.
- This also requires much communication across the teams and should involve people from the business side of the organization.
- Nowadays, Agile has gotten easier because of the sophisticated technologies like Slack and Zoom that help with collaboration.

Scrum:

- This is actually a subset of Agile.
- But the iterations are done as quick sprints, which may last a week or two.
- This helps with the momentum of a project and also make a larger project more manageable.
- It works quite well with software development.

Kanban:

- This comes from the Japanese word for visual sign or card.
- We can make use of visuals to help streamline the process.
- The general approach is similar to Agile as there is iterative development.

Waterfall:

- The waterfall model is about following a structured plan in which each step goes in much detail.
- It makes use of a project management tool, say, a Gantt chart.
- While the waterfall approach has its advantages, it has generally fallen out of favor.
- Some of the reasons are as follows: It can be tough to make changes, the process can be tedious and there is often a risk of a project being late.

4) DevOps

Ans)

- DevOps has emerged as a critical part of a company's digital transformation.
- The "Dev" part of the word is actually more than just about coding software.
- It also refers to the complete application process.
- "Ops," refers to something which involves system engineers and administrators as well as database administrators, network engineers, security experts and operations staff.
- DevOps has come about because of some major trends in IT.

- One is the use of agile development approaches.
- DevOps has proven effective in working with cloud computing environments.

15) Explain Flowchart.

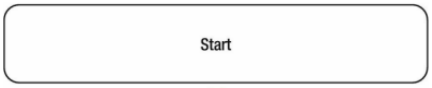
Ans)

- An essential part of RPA is understanding workflows and systems by the use of flowcharts.
- It's usually at the core of the software application.
- With a flowchart, you can both sketch out the existing workflows of a department.
- And then from here, you can brainstorm ways of improving them.
- Then you can use the flowchart to design a bot for the automation.
- The flowchart is relatively simple to use.

Let's take a look at some of the basics:

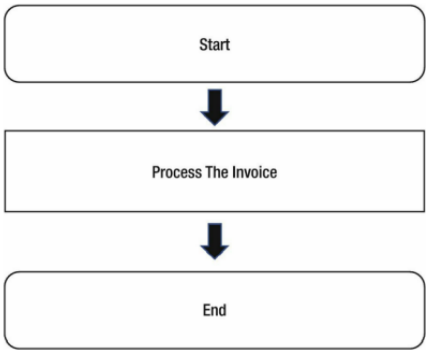
Terminator:

- This is a rectangle with rounded corners and is used to start and end the process.
- This is a terminator, which starts and ends a flowchart, shown below:



Process:

- This is represented by a rectangle.
- With this, there is only one next step in the process.
- Figure below shows an example:



Decision:

- This is a square symbol that is at an angle.
- There will be at least two possible paths.
- Figure below is an example: