**Unit 4**

**Q.1) Explain Artificial intelligence with advantages and Disadvantages ?**

* **Advantages of Artificial Intelligence:**
* **Reduction in Human Error:** One of the biggest advantages of Artificial Intelligence is that it can significantly reduce errors and increase accuracy and precision. The decisions taken by AI in every step is decided by information previously gathered and a certain set of algorithms. When programmed properly, these errors can be reduced to null.
* **Zero Risks:** Another big advantage of AI is that humans can overcome many risks by letting AI robots do them for us. Whether it be defusing a bomb, going to space, exploring the deepest parts of oceans, machines with metal bodies are resistant in nature and can survive unfriendly atmospheres. Moreover, they can provide accurate work with greater responsibility and not wear out easily.
* **24x7 Availability:** There are many studies that show humans are productive only about 3 to 4 hours in a day. Humans also need breaks and time offs to balance their work life and personal life. But AI can work endlessly without breaks. They think much faster than humans and perform multiple tasks at a time with accurate results. They can even handle tedious repetitive jobs easily with the help of AI algorithms.
* **Unbiased Decisions:** Human beings are driven by emotions, whether we like it or not. AI on the other hand, is devoid of emotions and highly practical and rational in its approach. A huge advantage of Artificial Intelligence is that it doesn't have any biased views, which ensures more accurate decision-making.
* **Disadvantages of Artificial Intelligence:**
* **High Costs:** The ability to create a machine that can simulate human intelligence is no small feat. It requires plenty of time and resources and can cost a huge deal of money. AI also needs to operate on the latest hardware and software to stay updated and meet the latest requirements, thus making it quite costly.
* **No creativity:** A big disadvantage of AI is that it cannot learn to think outside the box. AI is capable of learning over time with pre-fed data and past experiences, but cannot be creative in its approach. A classic example is the bot Quill who can write Forbes earning reports. These reports only contain data and facts already provided to the bot. Although it is impressive that a bot can write an article on its own, it lacks the human touch present in other Forbes articles.
* **Unemployment:** One application of artificial intelligence is a robot, which is displacing occupations and increasing unemployment (in a few cases). Therefore, some claim that there is always a chance of unemployment as a result of chatbots and robots replacing humans.
* **Make Humans Lazy:** AI applications automate the majority of tedious and repetitive tasks. Since we do not have to memorize things or solve puzzles to get the job done, we tend to use our brains less and less. This addiction to AI can cause problems to future generations.
* **No Ethics:** Ethics and morality are important human features that can be difficult to incorporate into an AI. The rapid progress of AI has raised a number of concerns that one day, AI will grow uncontrollably, and eventually wipe out humanity. This moment is referred to as the AI singularity.

**Q.2) State and explain the concept of morality and Ethics ?**

* The terms ethics and morality are used interchangeably, although a few different communities (academic, legal, or religious, for example) will occasionally make a distinction.
* Morality and ethics loosely have to do with distinguishing the difference between “good and bad” or “right and wrong.”
* Many people think of morality as something that’s personal and normative, whereas ethics is the standards of “good and bad” distinguished by a certain community or social setting.
* **For example**, your local community may think adultery is immoral, and you personally may agree with that. However, the distinction can be useful if your local community has no strong feelings about adultery, but you consider adultery immoral on a personal level. By these definitions of the terms, your morality would contradict the ethics of your community.
* In popular discourse, however, we’ll often use the terms moral and immoral when talking about issues like adultery regardless of whether it’s being discussed in a personal or in a community-based situation. As you can see, the distinction can get a bit tricky.
* It’s important to consider how the two terms have been used in discourse in different fields so that we can consider the connotations of both terms.
* **For example,** morality has a Christian connotation to many Westerners, since moral theology is prominent in the church.
* Similarly, ethics is the term used in conjunction with business, medicine, or law. In these cases, ethics serves as a personal code of conduct for people working in those fields, and the ethics themselves are often highly debated and contentious.
* These connotations have helped guide the distinctions between morality and ethics.

**Q.3) Explain the 4 Types of Ethics ?**

* **Meta Ethics:** Meta Ethics or “analytical ethics” deals with the origin of the ethical concepts themselves. It does not consider whether an action is good or bad, right or wrong. Rather, it questions – what goodness or rightness or morality itself is?
* It is basically a highly abstract way of thinking about ethics. The key theories in meta-ethics include naturalism, non-naturalism, emotivism and prescriptivism.
* Naturalists and non-naturalists believe that moral language is cognitive and can be known to be true or false.
* Emotivists deny that moral utterances are cognitive, holding that they consist of emotional expressions of approval or disapproval and that the nature of moral reasoning and justification must be reinterpreted to take this essential characteristic of moral utterances into account.
* Prescriptivists take a somewhat similar approach, arguing that moral judgments are prescriptions or prohibitions of action, rather than statements of fact about the world.
* **Applied Ethics:** Applied ethics deals with the philosophical examination, from a moral standpoint, of particular issues in private and public life which are matters of moral judgment.
* This branch of ethics is most important for professionals in different walks of life including doctors, teachers, administrators, rulers and so on. There are six key domains of applied ethics viz.
* Decision ethics {ethical decision making process}, Professional ethics {for good professionalism}, Clinical Ethics {good clinical practices}, Business Ethics {good business practices}, Organizational ethics {ethics within and among organizations} and social ethics.
* It deals with the rightness or wrongness of social, economical, cultural, religious issues also. For example, euthanasia, child labour, abortion etc.
* **Descriptive Ethics:** Descriptive ethics deals with what people actually believe (or made to believe) to be right or wrong, and accordingly holds up the human actions acceptable or not acceptable or punishable under a custom or law.
* However, customs and laws keep changing from time to time and from society to society. The societies have structured their moral principles as per changing time and have expected people to behave accordingly.
* Due to this, descriptive ethics is also called comparative ethics because it compares the ethics or past and present; ethics of one society and other.
* It also takes inputs from other disciplines such as anthropology, psychology, sociology and history to explain the moral right or wrong.
* **Normative Ethics:** Normative Ethics deals with “norms” or set of considerations how one should act. Thus, it’s a study of “ethical action” and sets out the rightness or wrongness of the actions.
* It is also called prescriptive ethics because it rests on the principles which determine whether an action is right or wrong.
* The Golden rule of normative ethics is “doing to other as we want them to do to us“. Since we don’t want our neighbours to throw stones through our glass window, then it will not be wise to first throw stone through a neighbour’s window.
* Based on this reasoning, anything such as harassing, victimising, abusing or assaulting someone is wrong. Normative ethics also provides justification for punishing a person who disturbs social and moral order**.**

**Q.4) What are the different ways of implementing the AI ?**

* There are several ways to implement AI, including:
* **Rule-based systems:** These systems use a set of predefined rules to make decisions and solve problems. They are simple and easy to understand but may not be able to handle exceptions and edge cases.
* **Expert systems:** These systems mimic the decision-making abilities of a human expert in a specific domain. They use a knowledge base of facts and rules, and a reasoning engine to make decisions.
* **Neural networks:** These systems are inspired by the structure and function of the human brain and are used for tasks such as image and speech recognition. They consist of layers of interconnected nodes, called artificial neurons, that can learn to recognize patterns in data.
* **Genetic algorithms:** These systems use techniques inspired by natural evolution, such as genetic mutation and selection, to optimize a solution. They can be applied to a wide range of problems, such as function optimization and scheduling.
* **Decision trees and random forests:** These systems use a flowchart-like structure to make decisions and predictions based on input data. Decision trees are simple to understand and interpret, but can be prone to overfitting, while Random Forests are an ensemble of decision trees and are less prone to overfitting.
* **Support vector machines:** These systems are used for classification and regression tasks and find the best boundary to separate data. They can be used for both linear and non-linear problems, and are effective in high-dimensional spaces.
* **Reinforcement learning:** These systems learn by trial and error, receiving rewards or penalties for certain actions, in order to achieve a specific goal. They can be applied to a wide range of problems, such as robot control and game playing.
* **Deep learning:** This is a subfield of machine learning that uses deep neural networks, which are neural networks with multiple layers, to improve the performance of certain tasks.

These are some of the most common ways to implement AI, but there are many other approaches and techniques used as well. It's also worth noting that these techniques are not mutually exclusive and can be combined to achieve better results.

**Q.5) Impact of artificial intelligence on Society?**

* **Positive Impacts of Artificial Intelligence on Society:** Artificial intelligence can dramatically improve the efficiencies of our workplaces and can augment the work humans can do.
* When AI takes over repetitive or dangerous tasks, it frees up the human workforce to do work they are better equipped for—tasks that involve creativity and empathy among others.
* If people are doing work that is more engaging for them, it could increase happiness and job satisfaction.
* With better monitoring and diagnostic capabilities, artificial intelligence can dramatically influence healthcare. By improving the operations of healthcare facilities and medical organisations, AI can reduce operating costs and save money.
* Our society will gain countless hours of productivity with just the introduction of autonomous transportation and AI influencing our traffic congestion issues not to mention the other ways it will improve on-the-job productivity. Freed up from stressful commutes, humans will be able to spend their time in a variety of other ways.
* The way we uncover criminal activity and solve crimes will be enhanced with artificial intelligence. Facial recognition technology is becoming just as common as fingerprints. The use of AI in the justice system also presents many opportunities to figure out how to effectively use the technology without crossing an individual’s privacy.
* Unless you choose to live remotely and never plan to interact with the modern world, your life will be significantly impacted by artificial intelligence.
* While there will be many learning experiences and challenges to be faced as the technology rolls out into new applications, the expectation will be that artificial intelligence will generally have a more positive than negative impact on society.
* **Challenges to be faced:** Artificial intelligence will definitely cause our workforce to evolve. The alarmist headlines emphasise the loss of jobs to machines, but the real challenge is for humans to find their passion with new responsibilities that require their uniquely human abilities
* According to PwC, 7 million existing jobs will be replaced by AI in the UK from 2017-2037, but 7.2 million jobs could be created. This uncertainty and the changes to how some will make a living could be challenging.
* The transformative impact of artificial intelligence on our society will have far-reaching economic, legal, political and regulatory implications that we need to be discussing and preparing for.
* Determining who is at fault if an autonomous vehicle hurts a pedestrian or how to manage a global autonomous arms race are just a couple of examples of the challenges to be faced.
* Will machines become super-intelligent and will humans eventually lose control? While there is debate around how likely this scenario will be we do know that there are always unforeseen consequences when new technology is introduced. Those unintended outcomes of artificial intelligence will likely challenge us all.
* Another issue is ensuring that AI doesn’t become so proficient at doing the job it was designed to do that it crosses over ethical or legal boundaries.
* While the original intent and goal of the AI is to benefit humanity, if it chooses to go about achieving the desired goal in a destructive (yet efficient way) it would negatively impact society.
* The AI algorithms must be built to align with the overarching goals of humans.
* Artificial intelligence algorithms are powered by data. As more and more data is collected about every single minute of every person’s day, our privacy gets compromised
* If businesses and governments decide to make decisions based on the intelligence they gather about you like China is doing with its social credit system, it could devolve into social oppression.

**Q.6) Impact of artificial intelligence on human Psychology ?**

* Artificial intelligence (AI) has the potential to greatly impact human psychology in a number of ways. One of the most significant effects is on how we process and understand information.
* AI algorithms can analyze vast amounts of data and make predictions or identify patterns that would be difficult or impossible for humans to discern.
* This can lead to improved decision-making and problem-solving abilities, but it also raises concerns about how much we are relying on AI and whether we are losing our own critical thinking skills.
* Another way that AI may impact human psychology is through its ability to interact with us in increasingly human-like ways.
* This could lead to greater feelings of trust and emotional connection with AI, but it could also lead to confusion or even deception if we are unable to distinguish between human and AI interactions.
* AI also has the potential to impact our sense of self and our relationships with others.
* **For example**, AI-powered virtual assistants and chatbots may become so advanced that we begin to rely on them for social interaction, which could lead to feelings of isolation or loneliness.
* On the other hand, AI-powered avatars or robots could help to bridge the gap for people who have difficulty with social interactions or have mobility issues.
* In addition, AI can also have an impact on our cognitive abilities, such as memory and attention.
* For example, when we outsource certain tasks such as directions or phone numbers to digital devices, we may become less reliant on our own memory and attention.
* AI can also have an impact on our emotional well-being, as we might feel overwhelmed by the constant access to information or the need to make quick decisions.
* Furthermore, there is the concern that AI systems will be used to manipulate emotions or influence behavior, which could have serious implications for privacy and autonomy.
* Overall, the impact of AI on human psychology is complex and multifaceted, with both positive and negative potential outcomes. Further research is needed to fully understand the implications of AI and to develop strategies for maximizing the benefits while minimizing the risks.

**Q.7) Impact of artificial intelligence on the legal system ?**

* The impact of artificial intelligence (AI) on the legal system can be significant, as it has the potential to change the way laws are created, interpreted, and enforced. Some of the key ways in which AI can impact the legal system include:
* **Legal research:** AI-powered legal research tools can help lawyers and judges quickly and accurately find relevant laws, cases, and statutes, which can increase efficiency and reduce the time and cost of legal proceedings.
* **Contract analysis:** AI-powered contract analysis tools can help lawyers and businesses quickly and accurately review and understand the terms of a contract, which can improve the speed and accuracy of contract negotiations.
* **Predictive analytics:** AI-powered predictive analytics can be used to predict the outcome of legal cases, which can help lawyers and judges make more informed decisions.
* **Sentencing and bail recommendations:** AI-powered algorithms can be used to assist judges and prosecutors in determining bail and sentence recommendations, which can improve the fairness and efficiency of the criminal justice system.
* **Crime prevention:** AI can be used to analyze crime data and make predictions about future criminal activity, which can help law enforcement agencies prevent and solve crimes.
* **Data Governance and Privacy:** The increasing use of AI in legal systems raises questions about data governance and privacy, such as how data is collected, stored, and shared, as well as the potential for bias in AI systems.
* **Liability:** The use of AI in the legal system raises questions about liability in the event of errors or accidents. It is important to establish clear guidelines and protocols for how AI systems should be used in legal contexts, and to ensure that they are subject to appropriate levels of oversight and accountability.
* **Ethical considerations:** AI's impact on the legal system also raises ethical concerns, such as the potential for AI to perpetuate existing biases and the need for transparency and explainability in decision-making.

It is important to note that AI can have both positive and negative effects on the legal system, and it is important to approach its use with caution, and to ensure that appropriate regulations and guidelines are in place to ensure that AI systems are used in an ethical and responsible manner. Additionally, it is also important to consider the potential long-term implications of AI on the legal system and society as a whole.

**Q.8) Impact of artificial intelligence on the environment and planet ?**

* The impact of artificial intelligence (AI) on the environment and planet is a relatively new and complex area of research. However, there are several ways in which AI can impact the environment and planet, including:
* **Energy consumption:** Training and running large-scale AI models can require significant computational resources, which in turn can require a lot of energy. This energy consumption can have a significant impact on the environment, particularly if it is generated from non-renewable sources.
* **Data centers:** The energy consumption of data centers which store and process the data required for AI models is also a concern. Data centers can consume a lot of energy, and the expansion of AI is likely to lead to an increase in the number of data centers and the energy they consume.
* **Resource consumption:** The production of the hardware components that make up AI systems, such as processors, memory chips, and other components, can also have a significant environmental impact due to the use of non-renewable resources, such as rare earth metals, and the carbon emissions associated with their production.
* **Autonomous systems:** AI-controlled autonomous systems such as drones, self-driving cars, and robots can have an impact on the environment through the increased consumption of resources, such as electricity, and through the production of waste, such as batteries.
* **Climate change:** Climate change is one of the most pressing environmental issues of our time, and AI has the potential to help mitigate its impacts through improved forecasting, modeling, and decision-making. However, the energy consumption of AI systems themselves can contribute to climate change.
* **Biodiversity:** AI has the potential to aid conservation efforts through the use of drones, cameras, and other sensor technologies, but it can also have negative effects on biodiversity if it is used to automate activities such as deforestation, hunting and fishing.
* **Natural resources:** AI can be used to optimize the use of natural resources such as water, land, and minerals. However, if not properly regulated, AI can also lead to over-exploitation of these resources.
* **Sustainable development:** AI can be used to support sustainable development goals such as poverty reduction, clean energy, and sustainable cities. However, if not aligned with these goals, AI can also contribute to environmental degradation and social inequalities.

Overall, it is important to consider the environmental impact of AI systems during the design, development, and deployment stages. This can include using renewable energy sources to power AI systems, designing more efficient algorithms and hardware, and incorporating sustainable development goals into AI projects.

**Q.9) Impact of artificial intelligence on trust ?**

* The impact of artificial intelligence (AI) on trust is a complex and multifaceted issue. Some of the key ways in which AI can impact trust include:
* **Lack of transparency and explainability:** One of the major concerns with AI systems is that their decisions and actions may be difficult for humans to understand or predict. This lack of transparency and explainability can lead to mistrust of AI systems, as people may be hesitant to rely on something they do not fully understand.
* **Bias and fairness:** AI systems can perpetuate and amplify existing biases in data, leading to discriminatory outcomes. This can undermine trust in the fairness and impartiality of AI systems.
* **Safety and security:** The potential for AI systems to cause harm if not properly designed and deployed can be a concern, leading to mistrust of AI systems.
* **Privacy and data protection:** The use of AI systems often requires large amounts of data, which can be sensitive or personal in nature. If this data is not properly protected, it can lead to mistrust of the organizations using AI systems, as people may be hesitant to share personal information with something that they do not trust.
* **Social and economic impact:** The potential for AI systems to disrupt existing industries and displace jobs can also lead to mistrust of AI systems, as people may be hesitant to rely on something that could potentially harm their livelihoods.
* **Human oversight:** When AI systems are designed to fully replace human judgement and decision-making, it can lead to mistrust of AI systems as people may feel like their autonomy is being taken away.
* **Lack of accountability**: when AI systems make decisions or take actions that have significant consequences for individuals or society, it can be difficult to determine who is responsible for those outcomes. This lack of accountability can also lead to mistrust of AI systems.

It is important to note that trust in AI systems can be built and maintained through transparency, explainability, and fairness in their design, use and outcomes. Additionally, by being open and transparent about the data, algorithms, and decision-making processes used by AI systems,

organizations can build trust with their stakeholders.

**Q.10) What are the different challenges of data governance?**

* Data governance refers to the overall management of data within an organization, including the processes and policies that are used to ensure that data is accurate, complete, and accessible. There are several challenges that organizations must contend with when implementing data governance:
* **Data complexity:** Organizations may collect and store large amounts of data from a variety of sources, which can make it difficult to understand and manage. This complexity can be further compounded by issues such as data silos, inconsistent data formats, and a lack of data lineage (i.e. the history of how data has been transformed and moved through the organization).
* **Data quality:** Ensuring that data is accurate, complete, and relevant is a critical aspect of data governance. However, data quality can be difficult to maintain, particularly when data is collected and stored in different systems and formats. Organizations must implement processes and tools to ensure that data is accurate and up-to-date, and that any issues with data quality are identified and addressed in a timely manner.
* **Data security:** Protecting data from unauthorized access or breaches is a key concern for organizations. Data governance must include policies and procedures to ensure that data is secure, and that any breaches are quickly identified and addressed.
* **Data privacy:** Organizations must also consider the privacy of the data they collect and store, and must comply with any relevant laws and regulations. This requires implementing processes and procedures to protect sensitive data, such as personal information, and ensuring that data is used in an ethical and responsible manner.
* **Data governance structure:** Data governance requires collaboration and coordination across multiple teams and departments within an organization. Establishing a clear governance structure and clearly defined roles and responsibilities is essential for effective data governance.
* **Data Governance in Cloud :** With the increasing use of cloud technology for data storage and processing, organizations must also consider how to effectively govern data in the cloud. This includes ensuring compliance with cloud providers' data management policies, as well as implementing appropriate security measures to protect data stored in the cloud.
* **Data Governance and AI** : With the increasing use of AI in organizations, data governance must also take into account the specific requirements of AI systems, such as the need for large amounts of high-quality training data and the need for transparency and explainability in decision-making.

These are just a few examples of the challenges that organizations may face when implementing data governance. It is important to have a comprehensive approach to data governance, including clear policies, procedures, and tools to ensure that data is managed effectively.

**Q.11) What are the ethical implications and responsibilities?**

* The ethical implications and responsibilities associated with the use of artificial intelligence (AI) are complex and multifaceted. Some of the key considerations include:
* **Bias and fairness:** AI systems can perpetuate and amplify existing biases in data, leading to discriminatory outcomes. It is important to ensure that AI systems are designed and tested for fairness, and that appropriate measures are taken to mitigate any biases that are found.
* **Transparency and explainability:** The decisions made by AI systems may be difficult for humans to understand or predict, which can lead to mistrust or lack of accountability. It is important to ensure that AI systems are designed to be transparent and explainable, so that their decisions can be understood and evaluated.
* **Safety and security:** AI systems have the potential to cause harm if they are not designed and deployed with safety in mind. It is important to ensure that appropriate safety measures are in place to prevent accidents or malicious use of AI systems.
* **Privacy and data protection:** AI systems rely on large amounts of data, which can be sensitive or personal in nature. It is important to ensure that appropriate measures are in place to protect the privacy and security of the data used to train and operate AI systems.
* **Social and economic impact:** AI systems have the potential to disrupt existing industries and displace jobs. It is important to consider the social and economic impacts of AI, and to take steps to mitigate any negative effects.
* **Human oversight:** AI systems are tools, and they should be used to enhance human capabilities, not replace them. It is important to ensure that appropriate levels of human oversight and control are in place, so that AI systems can be used safely and responsibly.

These are just a few examples of the ethical considerations that arise when working with AI. It is important to approach these issues with a sense of responsibility and to work towards solutions that benefit society as a whole.