आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

IFTM University, Moradabad, Uttar Pradesh

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Q1. What Is Organizational Knowledge?

Organizational knowledge is the sum of all knowledge contained within an organization that can provide business value. It may be gained from intellectual property, product knowledge, lessons of failure and success, conferences, or customer communications, just to name a few sources. Knowledge is always learned, preserved, and transmitted by people, so it's the key responsibility of Human Resources (HR) to help manage this knowledge.

One approach to capturing organizational knowledge is through repositories as part of a knowledge management effort. This is crucial if you want to avoid losing 42% of company knowledge relevant to a job role every time an employee leaves. And because the average new hire spends 200 unproductive hours on the job due to a lack of access to relevant knowledge, it's well worth the time spent investing in this important area of HR.

Organizational knowledge is the capability members of an **organization** have developed to draw distinctions in the process of carrying out their work, in particular concrete contexts, by enacting sets of generalizations whose application depends on historically evolved collective understandings.

- It is specific to the organization
- It is gained by experience
- It is used and shared to achieve the organizations objective.

Q2:- Explain distinct types of organizational knowledge.

Answer:-

Research indicates that it is possible to identify and study three distinct types of organizational knowledge: systemic, socio-political and strategic.

Systemic Knowledge. Systemic knowledge, or knowledge that is embedded in systems, policies, processes and procedures that govern how and what gets done in organizations. systemic knowledge is formally encoded in practices, procedures and routines and includes the acquisition and implementation of new techniques such as statistical quality control or the structure of compensation plans.

Socio-Political Knowledge. The second type of organizational knowledge is sociopolitical which refers to knowledge of the social and political composition of the organization including

its people, roles and responsibilities (who does what) as well as coalitions, influence networks, and formal and informal decision-making processes.

Strategic Knowledge. The third type of organizational knowledge is strategic knowledge, which refers to the position or context of the organization vis-à-vis its external environment and includes its history, status and position in the industry and society, its strategic plans, core competencies and competitive position. In its explicit form strategic knowledge includes the documented strategic context of the organization including knowledge of its history such as that recorded in annual reports and the news media. It also includes strategic plans, vision and mission statements, competitive analysis documents, and industry prospectus – the 'official word'.

Two sources of organizational knowledge:

a) Internal Sources

- intellectual property
- knowledge gained from experience
- lessons learned from failures and successful projects
- capturing and sharing undocumented knowledge and experience of experts within the organization
- results of improvements in processes, products and services

b) External Sources

- standards
- academia
- conferences
- gathering knowledge with customers or external providers

Q3. Explain types of knowledge?

Answer:-

Types of Knowledge

Knowledge can be divided into three main types:

Explicit Knowledge

Explicit knowledge is easily documented and indisputable, like procedures and policies, product and service functionality, step-by-step tasks, research, and content. It's most likely to be documented by technical writers, content strategists, instructional designers, and information architects.

Tacit Knowledge

Tacit knowledge is a learned sense of practical know-how, which is hard to articulate, such as how to repair a computer system. It's the realm of your subject matter experts; held inside your employees' heads; and transmitted through training, mentorships, and communities of practice. According to Nonaka & Takeuchi, "Tacit Knowledge is the knowledge of experience, and tends to be subjective and physical. It is about 'here and now', relates to a specific practical context."

Implicit Knowledge

Implicit knowledge, or embedded knowledge, is intuitive and embedded experience. It's ineffable, but you know it when you see it, such as the experience of senior employees, subject matter experts, the nature of professional relationships, and institutional processes. It's transmitted through social relationships.

Q4. Explain Sources and Repositories of Knowledge in detail.

Answer:-

Sources of Knowledge

Now that we know what types of knowledge to look out for, we'll go through potential sources of knowledge. Knowledge can be found almost anywhere in your organization and comes in many tangible and intangible forms. For example:

- **Individual**—a person's notebook, loose documents and files, customer queries and complaints, or an individual's memory. These are good sources of tacit knowledge.
- **Group/Community**—communities of practice, communities of excellence, project teams, internal teams, training groups, mentorship programs. These are good sources of explicit, implicit, and tacit knowledge.
- **Structural**—routines, processes, culture, traditional ways of doing things, IT systems, suppliers. These are sources of implicit knowledge.
- **Organizational memory**—the knowledge of your entire organization. It can be contained in guidelines, regulations, reports, market research, records, and data. These are good sources for a combination of tacit and explicit knowledge.

An illuminating example of individual, organizational, and structural sources of tacit and implicit knowledge is that which could have prevented the BP oil leak of 2006 at Prudhoe Bay. The leak

was not discovered for 5 days and led to fuel shortages at U.S. gas stations—not to mention 900,000 liters of oil being dumped into the ocean.

The reason behind this disaster? An experienced and qualified employee with specialized knowledge had left the company, and the employee was not replaced for budgetary reasons. This meant that there was no one to prevent the disaster from happening.

Failing to document this kind of knowledge creates the risk that future employees will repeat the mistakes of the past and that hundreds of millions of dollars will be lost. And yet one-third of HR professionals say that their companies do not collect and share specialized knowledge.

Repositories of Knowledge

So what can we do right now to document such important and specialized knowledge within our organizations? That's exactly what knowledge repositories were made for.

The definition of a knowledge repository is "a computer system that continuously captures and analyzes the knowledge assets of an organization," says Chris Kimble, Associate Professor at Kedge Business School.

Knowledge can be captured in many places, but it is most likely to be held within a knowledge management system (KMS). KMS repositories include:

- Documentation of any kind
- Internal knowledge bases
- Customer-facing knowledge bases
- FAQs
- Intranets
- Onboarding materials
- Training materials
- Webinars
- Case studies

Other repositories can include:

- Databases
- Internal collaboration tools
- Ticketing systems
- Wikis/communities/forums

There exists a wide range of ways to document your knowledge, but even the best technologies in the world must be combined with proper investment in a corporate culture that prizes and fosters knowledge sharing among employees. Your people are your most valuable assets when it comes to knowledge management.

Providing Business Value

Hopefully, you now have a better understanding of the definition of organizational knowledge, as well as its common sources and repositories. Sixty-three percent of employees want to work for companies in which unique knowledge is preserved, so knowledge management is a core way that HR can provide key business value, as it improves employee retention.

Remember, like the tribe of elephants, effective transmission of knowledge depends on communication between individual members of the tribe. This is best achieved by a knowledge sharing program. Choose the right knowledge repository for your needs to capture this specialized knowledge being shared by your employees.

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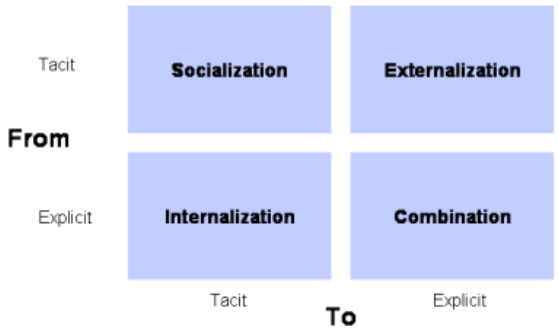
Q5. What do you understand by conversion of knowledge?

Answer:-

Knowledge Conversion:-

Knowledge is created through interaction between tacit and/or explicit knowledge. Tacit knowledge is individual, hasty and intangible. Explicit knowledge is in one way or the other described or laid down in symbols. It is tangible and can be held.

This leads to four types of knowledge conversion:



socialisation – from tacit knowledge to tacit knowledge

externalisation – from tacit knowledge to explicit knowledge

internalisation – from explicit knowledge to tacit knowledge

combination – from explicit knowledge to explicit knowledge.

Socialisation

Socialisation is about transferring individual knowledge from one person to another; for instance by joining an expert and seeing as well as experiencing how this expert proceeds. By doing things yourself you will gain experience and develop skills whereby the expert can supervise matters or confirm 'on the spot'.

Externalisation

Externalisation is a process in which tacit knowledge is expressed in explicit terms using metaphors, analogies, concepts, hypotheses and models. Such is possible by eliciting knowledge available with the expert. Examples include preparing a protocol or step-by-step plan based on an interview with the expert who used to do things off the cuff. In this way the expert's tacit knowledge becomes tangible and available for other people.

Internalisation

The Internalisation process allows the explicit knowledge to become part of the individual knowledge. The expression 'learning by doing' is used frequently in the enterprising world. Obviously a good example is the explicit description of a recipe including the ingredients. Ask ten people to prepare this recipe and you will end up with ten different dishes. Herman den Blijker (famous Dutch chef) even became a TV chef thanks to this formula. Now there's a beautiful link with the knowledge definition: each chef is more familiar with certain ingredients (information), has prepared a certain dish more or less often (experience), handles stress slightly differently (skill) and presents a boring or challenging plate (attitude). While making the dish one will run against problems that must be solved. These situations have not been described beforehand and will not be described afterwards. They have become the chef's tacit knowledge.

Combination

Combination is a process in which terms are joined together. A school example is to write your thesis. You pick a few models, and you combine them. And sometimes you get ten out of ten … J

One specific example of combining two models is the team development model and the leadership styles model. This combination helps you gain insight into which leadership style seems the most opportune for which mature phase of a team.

Knowledge Conversion Processes

There are four types of conversion processes which they describe as "fundamental to creating value". The four are the combinations of conversion of explicit and tacit knowledge.

1. Tacit-to-tacit (socialisation) - individuals acquire knowledge from others through dialogue and observation
2. Tacit-to-explicit (externalisation) - the articulation of knowledge into tangible form through elicitation and documentation
3. Explicit-to-explicit (combination) - combining different forms of explicit knowledge, such as that in documents or databases
4. Explicit-to-tacit (internalisation) - such as learning by doing, where individuals internalise knowledge into their own mental models from documents.

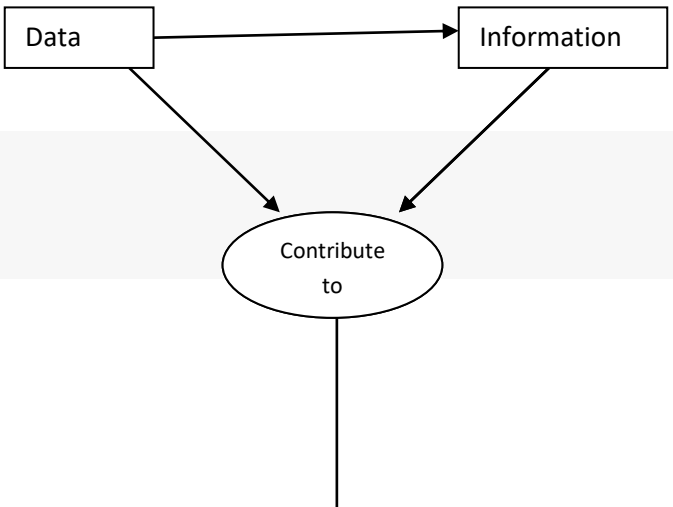
Q6:- what do you understand by knowledge management?

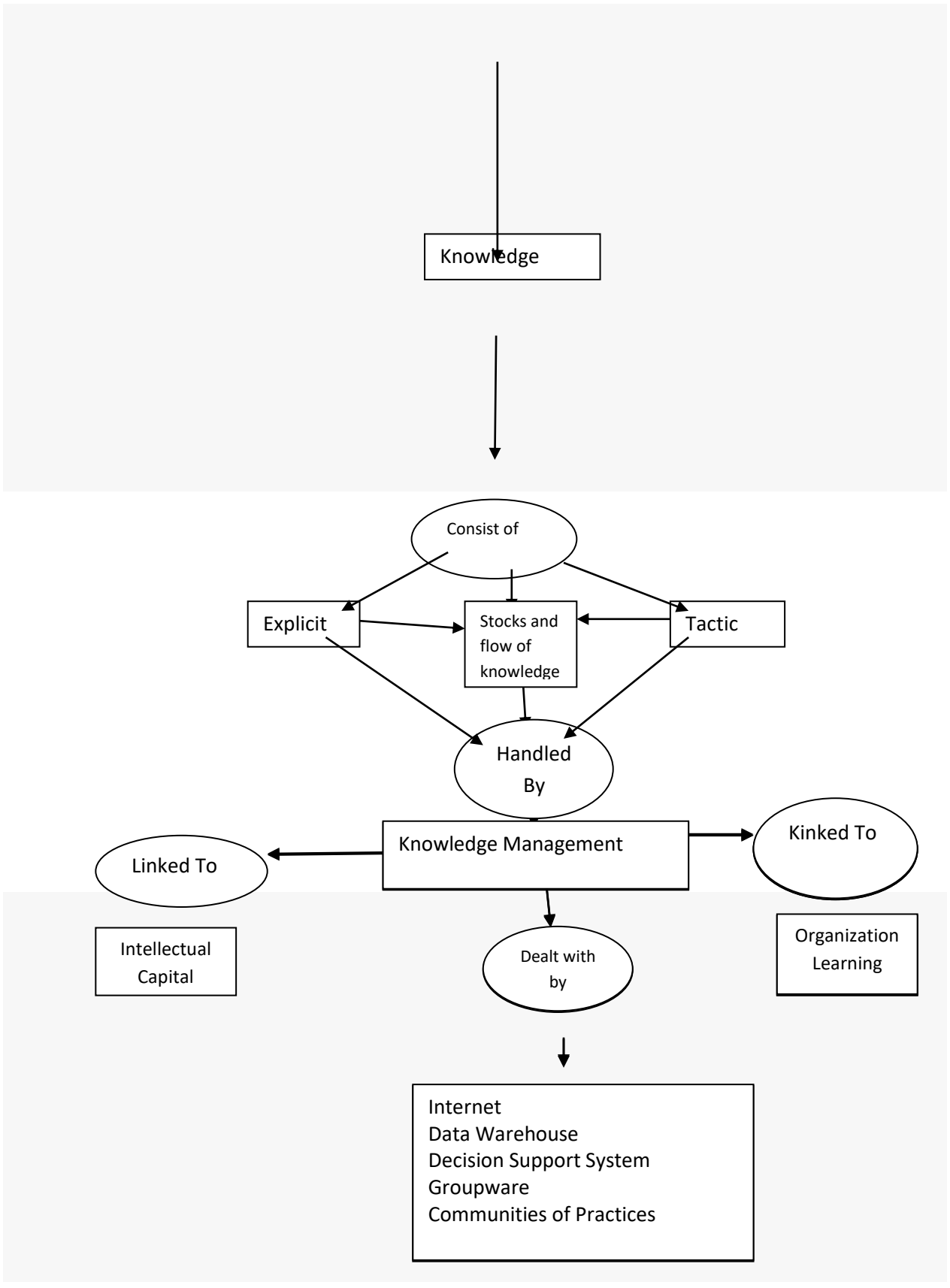
Answer:-

Knowledge Management:-The definition of knowledge management is how an organization creates, shares, uses, and manages information. It refers to improving the organization organically by making the best use of the knowledge at its disposal.

In the simplest variant, a Knowledge Management system consists of the following:

- A simple internal process to capture company knowledge
- A Community of Practice (internal experts) to review information that comes in
- Technology to support this process and the Community of Practice.




Knowledge
Consist of
Explicit
Stocks and flow of knowledge
Tactic
Handled By
Knowledge Management
Linked To
Kinked To
Intellectual Capital
Dealt with by
Organization Learning
Internet
Data Warehouse
Decision Support System
Groupware
Communities of Practices

Q7. Explain Knowledge Management Frameworks and Models in detail.

Answer:-

Knowledge Management Frameworks and Models :-

A good model can integrate various elements and show relationships in a way that is much harder to do in writing.

But first, what are the components of a knowledge management framework? At the most basic level, KM consists of the following steps:

- Identification of needs
- Identification of knowledge resources
- Acquisition, creation, or elimination of knowledge related resources/processes/environments
- Retrieval, application and sharing of knowledge
- Storage of knowledge
    - It is important to note that none of these processes are independent and all of them are affected by countless factors. This is why knowledge management frameworks are typically very different and can be presented in a wide variety of ways.
    - For instance, some models are sequential (as above), and seek to provide a better overview at the expense of "realism". Other models display overlapping processes in an attempt to simulate what actually occurs inside an organization. The problem with the latter is that they are often hard to grasp and can only convey limited information so as not to become incomprehensible.

Since KM is closely related or dependant on other disciplines (such as strategy, information management, project management, etc.) and it is enabled by a wide range of processes and systems, a model can become very complex indeed.

This is why there is no such thing as an integrated and fully detailed knowledge management framework, i.e. one that captures all relevant aspects with appropriate detail. Each model must choose its focus and origin, as well as its limitations.

There are essentially three questions that a knowledge management framework may choose to answer:

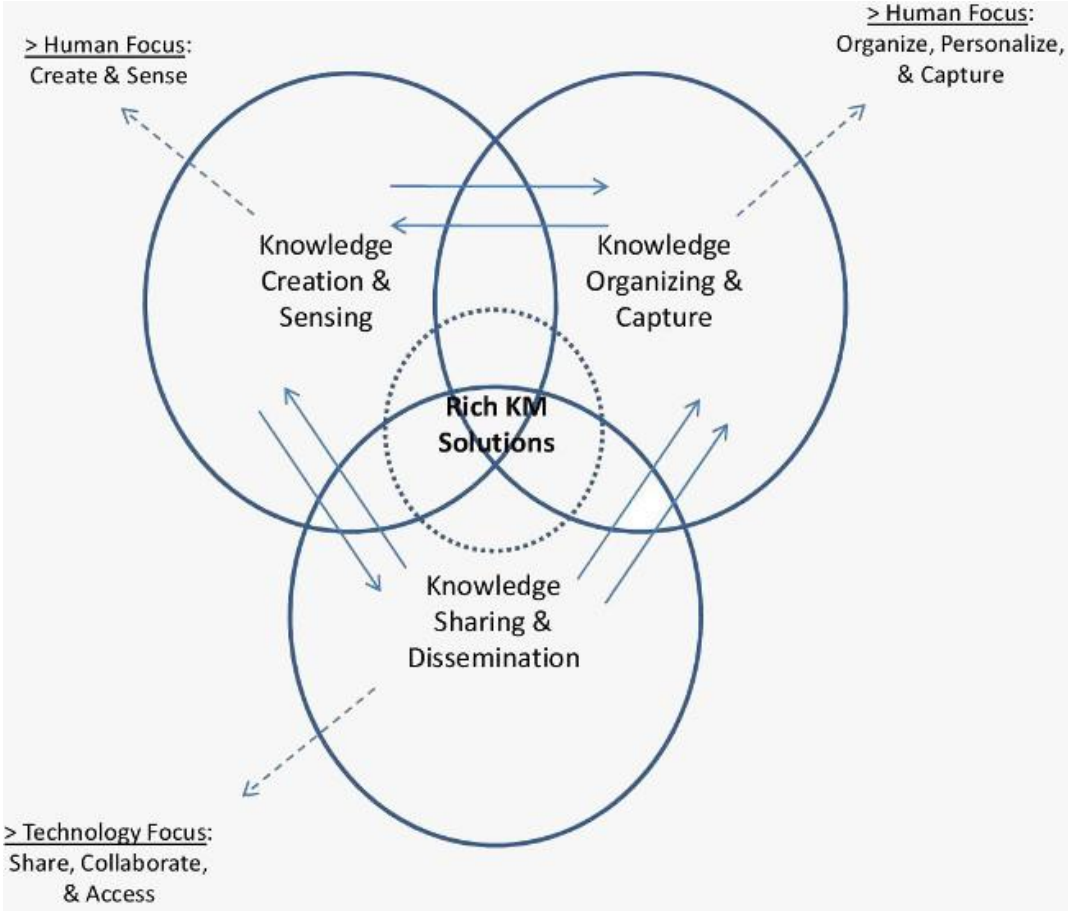
- What/How
- Why
- When

"What/how" refers to the actual processes of knowledge management. "Why" refers to an indication of the reasons behind using one method or the other. "When" refers to the timing for using one method or another, and is very closely related to "why".

The latter two questions are usually tackled in more strategic oriented models that take a broader perspective. What/how is usually dealt with in process oriented models that focus on an understanding of the tools available to the manager. These kinds of models are generally more common particularly since the role of knowledge management can be defined far more narrowly than I have chosen to do on this site.

You don't know	Knowledge Discovery	Explore, Research, Create
You know	Knowledge Repository (Knowledge Base)	Knowledge Sharing and Transfer
	Knowledge you have	Knowledge you don't have

Here, one can see the role of knowledge management from a broad perspective (very similar to the one adopted on this site), i.e. which includes more than just knowledge sharing/access/etc, but also new knowledge creation. These categories provide a solid overview of the components of any knowledge management framework focusing on the what/how question.



Q8 :- Explain benefits & key issues concerning knowledge management.

Answer:-

THE BENEFITS OF KNOWLEDGE MANAGEMENT SYSTEMS :- Knowledge management may provide large benefits. Some of them are-

1. Develop your problem statement / define the problem you're trying to solve
2. Isolate a portion of your organization that you think is either interested in or is competent to brainstorm solutions to this problem. This becomes your initial network
3. Create a call to action and brand your campaign / get your entire organization on board and get them interested!
4. Develop a simple process to capture ideas (suggestion box/feedback card/website)
5. Solicit ideas/review ideas with your initial network
6. Implement quick wins & offer praise to the problem contributors

Organizational learning and development becomes more difficult to manage as your company grows. Without managing critical information, team members may take important pieces of tribal knowledge with them when they leave, new employees are forced to learn their roles without any guidance, and a tremendous amount of time is wasted learning and relearning the same processes in inconsistent ways.

But as an organization matures, it forms stronger linkages between leadership, culture, and strategy to allow for longer-term operations planning and enhanced daily operational performance. So why not start considering knowledge management to help support this?

Knowledge management helps gather the power from your entire organization and use it to incrementally improve your daily operations. It enables organizations to learn more intuitively, allowing companies to innovate better through knowledge-sharing organizational structures, processes, and tools. By making their jobs easier and providing a platform to learn new skills, you can engage your workforce by making their work more interesting and relevant. That effort ultimately leads to a series of advantages which, day by day, helps your company stack up better than your competition.

KEY ISSUES CONCERNING KNOWLEDGE MANAGEMENT:-

When asked about their key concerns about knowledge management, the managers expressed concern primarily over the cultural, managerial and informational issues. In terms of the culture, the managers were concerned over the implications for change management, the ability to convince people to volunteer their knowledge, and the ability to convince business units to share their knowledge with other units (particularly when each business unit was responsible for showing a profit). The managerial concerns related to the business value of knowledge management and the need for metrics upon which to demonstrate the value. There was concern about determining who would be responsible for managing the knowledge and above all of bringing together the many players involved in developing KMS, including technical staff, corporate librarians, documentation staff, archivists, database administrators, and the professionals with the knowledge. Concern was also expressed over how to implement KMS effectively.

Information- Building vast amounts of data into usable form Avoiding overloading users with unnecessary data Eliminating wrong/old data Ensuring customer confidentiality Keeping the information current.

Management Change management implications Getting individuals to volunteer knowledge Getting business units to share knowledge Demonstrating business value Bringing together the many people from various units Determining responsibility for managing the knowledge.

Technology- Determining infrastructure requirements keeping up with new technologies Security of data on Internet

Generally speaking, the managers expressed concern that knowledge management might be perceived by senior managers as just another "fad" and that the concept suffered from immaturity. Particularly those managers from organizations that had not yet implemented KMS expressed a need to better understand the concept and to be convinced that knowledge management "worked" before pursuing KMS.

The concerns related to information were primarily associated with a desire to avoid overloading already taxed users with yet more information. The concern was as much about the new information that would now be available as it was about eliminating "old/wrong data" or knowledge that was no longer valid.

Lastly, several managers expressed some concerns over technological issues. These issues were related to technical infrastructure and the security of data on the Internet. More specifically, the need for configuring an effective technical infrastructure and architectural requirements in the face of highly dynamic technology was reported.

Q9:- Explain Knowledge Management Challenges. Also tell how to overcome these challenges?

Answer:-

Today's Knowledge Management Challenges

1. **Security.** Providing the right level of security for knowledge management is key. Sensitive information should be shielded from most users, while allowing easy access to those with the proper credentials.
2. **Getting people motivated.** Overcoming organizational culture challenges and developing a culture that embraces learning, sharing, changing, improving can't be done with technology. There is no use in launching a tool if there is no drive to share the knowledge.

3. **Keeping up with technology.** Determining how knowledge should be dispensed and transferring it quickly and effectively is a huge challenge. Constantly changing structures mean learning how to be smart, quick, agile and responsive – all things a KM tool must be able to accomplish.
4. **Measuring knowledge.** Knowledge is not something that can be easily quantified, and is far more complex because it is derived out of human relationships and experience. The focus should be on shared purpose rather than results or efforts.
5. **Overcoming shared leadership.** KM tools allow others to emerge as voices of power within an organization. Workers are given a "voice", which can sometimes cause internal conflict.
6. **Keeping data accurate.** Valuable data generated by a group within an organization may need to be validated before being harvested and distributed. Keeping information current by eliminating wrong or old ideas is a constant battle.
7. **Interpreting data effectively.** Information derived by one group may need to be mapped or standardized in order to be meaningful to someone else in the organization.
8. **Making sure information is relevant.** Data must support and truly answer questions being asked by the user, and requires the appropriate meta-data to be able to find and reference. Data relevancy means avoiding overloading users with unnecessary data.
9. **Determining where in the organization KM should reside.** Does KM fall under HR, IT, communications? This decision will determine what drives your knowledge sharing initiative and who will be responsible for maintaining the community.
10. **Rewarding active users.** Recognizing the users who actively participate and contribute to a knowledge database will not only encourage them to continue contributing, but will also encourage other users to join.

Overcoming Knowledge Management Challenges

Knowledge, learning and sharing come from people and their relationships with one another, not necessarily from the tools, databases and technological aids used. However, with the proper technology in place you can facilitate better communication and overcome these challenges to have an up-to-date, secure and organized knowledge base.

Knowledge Management in Virtual Organization:- today's organizations need to transform from traditional industrial enterprises into the modern post-industrial ones, which contributes to the flexibility and innovativeness of them. Thus, they should focus on knowledge sharing among personnel and their partners which helps organizations to adapt themselves to the rapid environmental changes and to achieve superior performance.

knowledge management is about getting knowledge from those who have it to those who need it in order to improve organizational effectiveness. In the information age, knowledge rather than physical assets or financial resources is the key to competitiveness.

"Knowledge management allows companies to capture, apply and generate value from their employees' creativity and expertise.

Moreover, because of the special structure of virtual organizations, creating, sharing and managing knowledge in such organizations need to be understood by managers to provide competitive advantages.

UNIT-3

Q1. Explain Knowledge Management System Architecture in detail.

Answer:-

Knowledge Management System Architecture

Developing a KMS is a complex task and requires a careful planning before selecting the tools for supporting the knowledge processes. The designed system architecture should suit the organizational culture and business needs. KMS can be as simple as a file folder until a complex business intelligence system which uses an advanced data visualization and artificial intelligence. Thus, we have studied several KMS architectures which aim to support knowledge management processes and collaboration in the organization. We found that even if there are differences between architectures in term of functions and services, the major components of architecture are comparable. The general KMS architecture is proposed by Tiwana [Tiwana 02]. He pointed out that the KMS should comprise four major components: repository, collaborative platform, network, and culture.

1. Repository holds explicated formal and informal knowledge, such as declarative knowledge, procedural knowledge, causal knowledge, and context. This component acts as the core of KMS which aims to store and retrieve knowledge for future use.
2. Collaborative platform supports distributed work and incorporates pointers, skills databases, expert locators, and informal communications channels.
3. Network means both physical and social networks that support communication and conversation. Physical network is a ‘hard’ network such as intranet, shared space, and back bone. Social network is a ‘soft’ network such as Communities of Practice (CoP), associations, and working groups.
4. Culture is the enabler to encourage sharing and use of the KMS. Research has revealed that the greatest difficulty in KM is ‘‘changing people’s behavior,’’ and the current biggest impediment to knowledge transfer is ‘‘culture’’.

These four components are considered as the basis elements for each knowledge management system. However, other tools could be integrated to enhance the quality of services of the system. Tiwana also proposed seven-layer KMS architecture [Tiwana 02] which is the integration of these four components and their supportive information technologies.

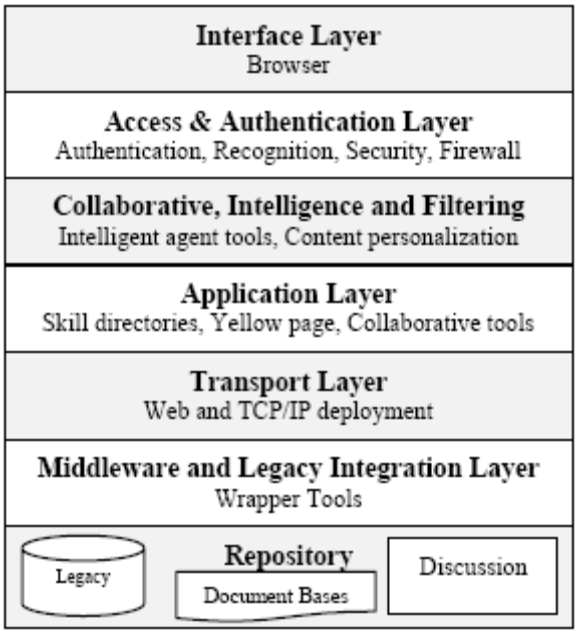


Figure II.4: Seven layers KMS architecture

Actually, seven layer KMS architecture is just a reflection of OSI model (Open Systems Interconnection basic reference model). This model tries to represent the functions and tools of KMS in terms of layer that the knowledge passed though. This architecture might suit with complex systems which require network and data manipulation.

Chua [Chua 04] has proposed a simple architecture called three-tiered KMS architecture which is composed of three services i.e. *infrastructure services*, *knowledge services*, and *presentation services*. These services aim at supporting knowledge processes and communication in the organization. This system emphasizes technologies that help creating, sharing, and storing knowledge. Figure II.5 illustrated Chua's three-tiered KMS architecture

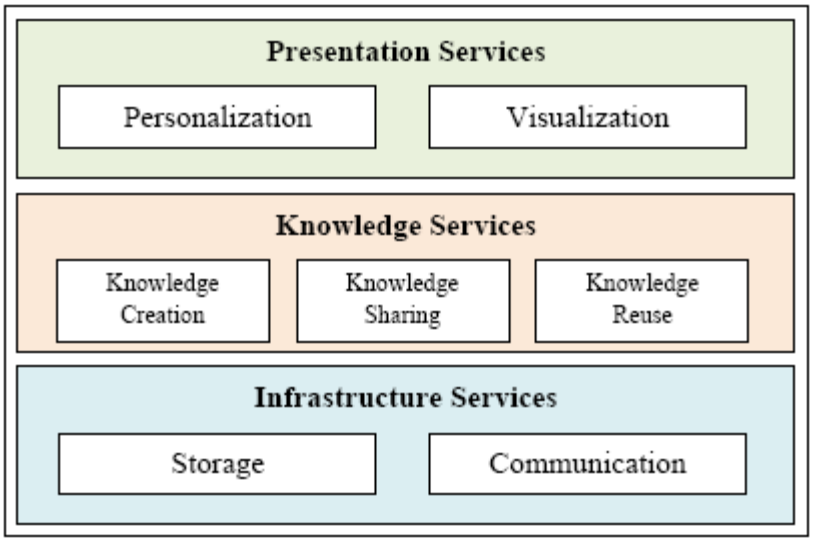


Figure II.5: The three-tiered architecture

- The first tier in this model comprises the infrastructure services which focus on storage and communication technology. Storage technology is a part of a repository in the general model, and is typically the basis for supporting KM processes, particularly knowledge creation and knowledge reuse. The communication technology makes possible for the KMS to support knowledge transferring activity among the users.
- The second tier is the knowledge services which focus on technologies for creating, sharing, and reusing of knowledge in the system. The technology for knowledge creation helps users to convert their tacit knowledge in to codified (explicit) knowledge. Knowledge sharing technology refers to the flow of knowledge from one part of the organization to other parts. The knowledge reuse helps users to retrieve required knowledge from the system when needed.
- The third tier is presentation services which mainly focus on displaying the suitable information for users to support their decision-making. Technologies that provide presentation services are primarily concerned with enhancing the interface between the user and the information/knowledge sources. This part is related to the culture of knowledge usage of the organization by visualizing and personalizing all services in the KMS to suit the organizational culture. However, to design these services, the organizational analysis is required.

One of the technical perspectives of KMS architecture was proposed by Meso and Smith [Meso 00], as shown in figure II.6, which consists of three components: technology, function and knowledge. This model involves the processes for acquiring or collecting, organizing, disseminating or sharing knowledge among people in an institution.

Meso and Smith's model relies on four functions of knowledge processes: using, finding, creating, and packaging knowledge. These four functions are supported by various information technologies (such as messaging, web browsing, data mining, intelligent agents, etc.) that aim to facilitate the knowledge process. The objective of this model is to enhance each type of knowledge in different taxonomy i.e. know-how, know-what, know-why, self-motivated creativity, personal tacit, cultural tacit, organizational tacit, and regulatory assets. Alavi [Alavi 99] supports this concept by specifying that *KMS refer to a class of information system applied to managing organizational knowledge* and support knowledge processes.

The reviews show that there is no single solution for neither designing, nor best practice of the KMS architecture. Each system is designed to fit with the different culture, activity, strategy, and objective of each organization.

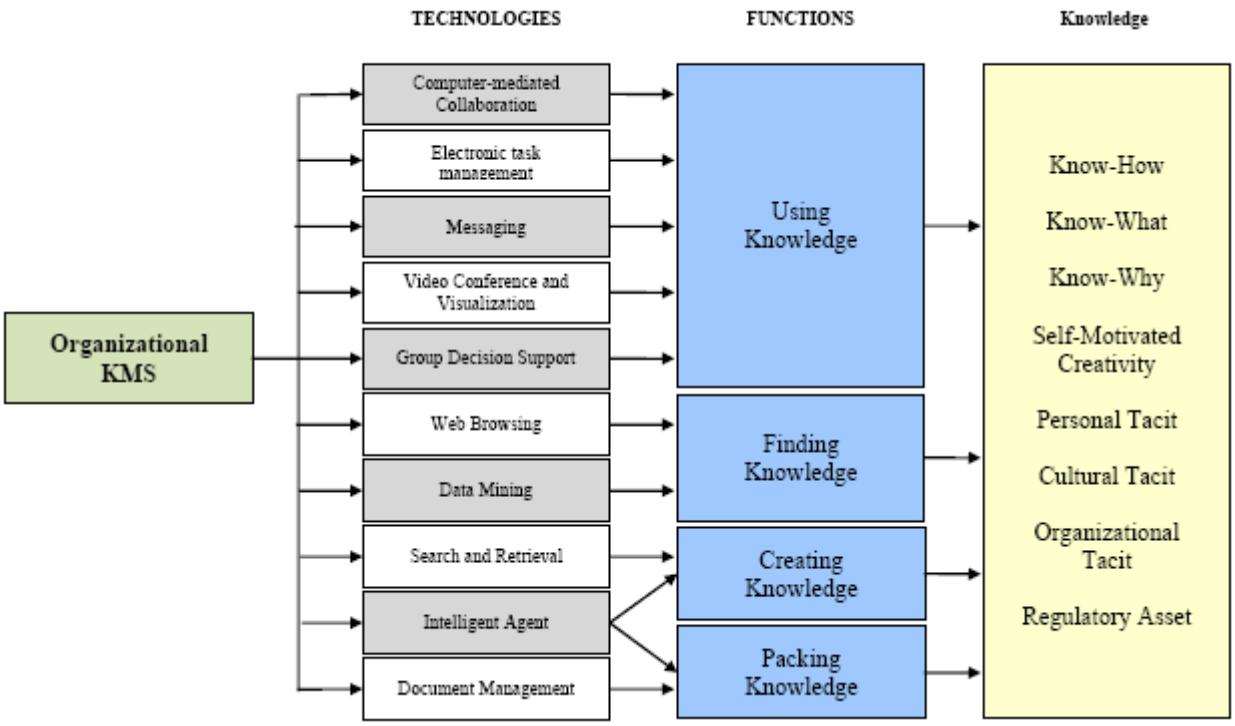


Figure II.6: A technical perspective of KMS architecture

They also showed that KMS is composed of three common applications: (1) the coding and sharing of best practices, (2) the creation of corporate knowledge directories, and (3) the creation of knowledge networks. The next section will present a list of information technology generally used in KM projects and compare their function with the knowledge processes.

UNIT -4

Q1. What do you understand by artificial intelligence also explain its importance in detail?

Answer:-

"Artificial Intelligence (AI) is a branch of Science which deals with helping machines finds solutions to complex problems in a more human-like fashion."

This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way.

From a business perspective AI is a set of very powerful tools, and methodologies for using those tools to solve business problems.

Meaning and the Definition

George Luger and William Stable field defined Artificial Intelligence as "a branch of the computer science that is mainly concerned with the automation of the intelligent behavior".

Dan Patterson defined Artificial Intelligence as "a branch of the computer science concerned with the study and the creation of the computer systems that exhibit some form of the intelligence: systems that learn the new concepts and the tasks, systems that can reason and also draw the useful conclusions about the world around us, systems that can under – stand the various natural languages and perceive and comprehend a visual scene and the systems that perform the other types of the feats that essentially require the human types of the intelligence".

Artificial Intelligence can be under – stood as the technology playing a very major part in the application of the computers to the areas or the fields, which requires the basic knowledge, the perception, the reasoning, the understanding and the cognitive abilities. By having all this, it really becomes possible to distinguish the human behavior from the machines like the computers etc. Artificial Intelligence actually is the science and the engineering involving the making of the intelligent machines and one major point to be remembered here is that the Artificial Intelligence is related a great deal to the similar task of making use of the computers in order to under – stand the human intelligence. Human intelligence is also referred to as the natural intelligence and the below explained comparison between the Natural Intelligence and the Artificial Intelligence helps a great deal in under – standing the concept of both the Artificial Intelligence and the Natural Intelligence and the basic differences that occur between them.

Importance of AI

Game Playing:- We can buy machines that can play master level chess for a few hundred dollars. There is some AI in them, but they play well against people mainly through brute force computation--looking at hundreds of thousands of positions. To beat a world champion by brute force and known reliable heuristics requires being able to look at 200 million positions per second.

Speech Recognition:- In the 1990s, computer speech recognition reached a practical level for limited purposes. Thus United Airlines has replaced its keyboard tree for flight information by a system using speech recognition of flight numbers and city names. It is quite convenient. On the other hand, while it is possible to instruct some computers using speech, most users have gone back to the keyboard and the mouse as still more convenient.

Understanding Natural Language:- Just getting a sequence of words into a computer is not enough. Parsing sentences is not enough either. The computer has to be provided with an understanding of the domain the text is about, and this is presently possible only for very limited domains.

Expert Systems:- A ``knowledge engineer'' interviews experts in a certain domain and tries to embody their knowledge in a computer program for carrying out some task. How well this works depends on whether the intellectual mechanisms required for the task are within the present state of AI. When this turned out not to be so, there were many disappointing results.

It did better than medical students or practicing doctors, provided its limitations were observed. Namely, its ontology included bacteria, symptoms, and treatments and did not include patients, doctors, hospitals, death, recovery, and events occurring in time. Since the experts consulted by the knowledge engineers knew about patients, doctors, death, recovery, etc., it is clear that the knowledge engineers forced what the experts told them into a predetermined framework. The usefulness of current expert systems depends on their users having common sense.

Q2. Explain in detail applications of AI.

Answer:-

<u>The applications of AI</u>

Q3. What do you understand by expert system?

Answer:-

Expert System:

Meaning and the Definition of Expert Systems

From the time of the origin of the expert systems, different types of the persons who use it i.e. the users tend to have an under – standing about the expert system depending on the type of the work in which that particular user is using the expert system. Hence, it can be said that the different users have different definitions of the expert system. There is no particular definition of the expert system which has the ability to completely fulfill or satisfy all the queries of the various users.

According to Peter Jackson, “an expert system can be defined as the computer program that has the ability to represent and reason with the knowledge of some of the particular subject specialist with a view to solving problems or giving any type of the advice.

In general an expert system can be referred to as the technology that has the ability to make the computer programming very easier in the nature and also very effective in the working. The expert system also helps in carrying out the transformation in the computing with the help of the movement of the various programming techniques beyond the numerical programming into a realm of the logical, symbolic programming.

Following are the applications of Expert Systems:-

1. Make computer programming very easier in the nature.
2. Make computer programming effective in the working.
3. Transforms the computing by moving the programming technologies beyond the numerical programming into a realm of the logical and the symbolic programming.
4. Helps to solve the different types of the problems practically of every field and every discipline.
5. Play a very critical role in the different stages of the problem – solving process.
6. Have a variety of the complex applications in the different types of the fields that can be categorized as the follows –

i. Aero – space technology.
ii. Air – line aviation.
iii. Criminology.
iv. Education.
v. Security analysis.
vi. Port – folio management.
vii. Personnel management.
viii. Manufacturing design and the assembly.
ix. Food industry.
x. Health care management.
xi. Geo – logical data analysis.
xii. Interpreting the oil exploration drilling sites.
xiii. Tax planning.
xiv. Quality control.
xv. Quality monitoring.
xvi. Strategic goal setting.
xvii. Configuring the various computer systems.
xviii. Trouble shooting telephone network.
xix. Gene – cloning experiments.
xx. Foreign exchange management.

Limitations of the Expert Systems

1. The concept of the Expert Systems mainly involves a very narrow range of the codified domain.
2. The Expert Systems are not generally adopted at managing the highly sophisticated sensory inputs.
3. The Expert Systems mainly function in the domain of the extracted, cognitive, logical thinking process.
4. The different types of the multi – dimensional problems that are faced by the various users while performing the various activities, cannot be efficiently tackled by the Expert Systems.
5. Some of the typical Expert Systems at times are not able to make available common sense knowledge and the broad – ranging contextual information.
6. Very narrow range of the knowledge is incorporated in the Expert Systems.
7. The Expert Systems do – not respond well to the various situations out – side their range of the expertise.
8. The Expert Systems remain what they are – the machine experts.
9. The human self – awareness is lacking in the Expert Systems.
10. The various Expert Systems lack the much needed self – analysis tools.
11. The Expert Systems are non – self referral systems.
12. In case of the Expert Systems, no introspection is possible.
13. The Expert Systems have the ability of performing only with – in a specific, logical – oriented realm of the expertise.

Q4. What do you understand by neural network also explain artificial neural network in detail?

Answer:-

A Neural network (also called an ANN or an artificial neural network) is a sort of computer software, inspired by biological neurons. Biological brains are capable of solving difficult problems, but each neuron is only responsible for solving a very small part of the problem. Similarly, a neural network is made up of cells that work together to produce a desired result, although each individual cell is only responsible for solving a small part of the problem. This is one method for creating artificially intelligent programs.

Neural networks are an example of machine learning, where a program can change as it learns to solve a problem. A neural network can be trained and improved with each example, but the larger the neural network, the more examples it needs to perform well—often needing millions or billions of examples in the case of deep learning.

Artificial neural networks (ANNs) or connectionist systems are computing systems vaguely inspired by the biological neural networks that constitute animal brains. Such systems "learn" (i.e. progressively improve performance on) tasks by considering examples, generally without task-specific programming. For example, in image recognition, they might learn to identify images that contain cats by analyzing example images that have been manually labeled as "cat" or "no cat" and using the results to identify cats in other images. They do this without any a priori knowledge about cats, e.g., that they have fur, tails, whiskers and cat-like faces. Instead, they evolve their own set of relevant characteristics from the learning material that they process.

An ANN is based on a collection of connected units or nodes called artificial neurons (a simplified version of biological neurons in an animal brain). Each connection (a simplified version of a synapse) between artificial neurons can transmit a signal from one to another. The artificial neuron that receives the signal can process it and then signal artificial neurons connected to it.

In common ANN implementations, the signal at a connection between artificial neurons is a real number, and the output of each artificial neuron is calculated by a non-linear function of the sum of its inputs. Artificial neurons and connections typically have a weight that adjusts as learning proceeds. The weight increases or decreases the strength of the signal at a connection. Artificial neurons may have a threshold such that only if the aggregate signal crosses that threshold is the signal sent. Typically, artificial neurons are organized in layers. Different layers may perform different kinds of transformations on their inputs. Signals travel from the first (input), to the last (output) layer, possibly after traversing the layers multiple times.

Neural networks as functions

Neural network models can be viewed as simple mathematical models defining a function or a distribution over or both and . Sometimes models are intimately associated with a particular learning rule. A common use of the phrase "ANN model" is really the definition of a *class* of such functions (where members of the class are obtained by varying parameters, connection weights, or specifics of the architecture such as the number of neurons or their connectivity).

Networks such as the previous one are commonly called feed forward, because their graph is a directed acyclic graph. Networks with cycles are commonly called recurrent.

Application of Neural Network

Because of their ability to reproduce and model nonlinear processes, ANNs have found many applications in a wide range of disciplines.

Application areas include system identification and control (vehicle control, trajectory prediction, process control, natural resource management), quantum chemistry, game-playing

and decision making (backgammon, chess, poker), pattern recognition (radar systems, face identification, signal classification, object recognition and more), sequence recognition (gesture, speech, handwritten and printed text recognition), medical diagnosis, finance (e.g. automated trading systems), data mining, visualization, machine translation, social network filtering and e-mail spam filtering.

ANNs have been used to diagnose cancers, including lung cancer, prostate cancer, and colorectal cancer and to distinguish highly invasive cancer cell lines from less invasive lines using only cell shape information.

ANNs have been used to accelerate reliability analysis of infrastructures subject to natural disasters.

ANNs have also been used for building black-box models in geosciences: hydrology, ocean modelling and coastal engineering, and geomorphology, are just few examples of this kind.

Q5. Explain fuzzy logic and its application in detail.

Answer:-

Fuzzy logic is a form of many-valued logic in which the truth values of variables may be any real number between 0 and 1. It is employed to handle the concept of partial truth, where the truth value may range between completely true and completely false. By contrast, in Boolean logic, the truth values of variables may only be the integer values 0 or 1.

The term fuzzy logic was introduced with the 1965 proposal of fuzzy set theory by Lotfi Zadeh.

Fuzzy logic has been applied to many fields, from control theory to artificial intelligence.

Application of Fuzzy Logic

Many of the early successful applications of fuzzy logic were implemented in Japan. The first notable application was on the subway train in Sendai, in which fuzzy logic was able to improve the economy, comfort, and precision of the ride It has also been used in recognition of hand written symbols in Sony pocket computers, flight aid for helicopters, controlling of subway systems in order to improve driving comfort, precision of halting, and power economy, improved fuel consumption for automobiles, single-button control for washing machines, automatic motor control for vacuum cleaners with recognition of surface condition and degree of soiling, and prediction systems for early recognition of earthquakes through the Institute of Seismology Bureau of Meteorology, Japan.

Q6. What is Virtual Reality also write its application?

Answer:-

Virtual reality (VR) is a computer-generated scenario that simulates experience. The immersive environment can be similar to the real world or it can be fantastical, creating an experience not

possible in our physical reality. Augmented reality systems may also be considered a form of VR that layers virtual information over a live camera feed into a headset, or through a smartphone or tablet device.

Current VR technology most commonly uses virtual reality headsets or multi-projected environments, sometimes in combination with physical environments or props, to generate realistic images, sounds and other sensations that simulate a user's physical presence in a virtual or imaginary environment. A person using virtual reality equipment is able to "look around" the artificial world, move around in it, and interact with virtual features or items. The effect is commonly created by VR headsets consisting of a head-mounted display with a small screen in front of the eyes, but can also be created through specially designed rooms with multiple large screens.

VR systems that include transmission of vibrations and other sensations to the user through a game controller or other devices are known as haptic systems. This tactile information is generally known as force feedback in medical, video gaming and military training applications.

Application of Virtual reality

VR has many applications in a variety of fields. It is most commonly used in entertainment applications such as gaming and 3D cinema. Consumer virtual reality headsets were first released by video game companies in the early-mid 1990's. Beginning in the 2010's, next-generation commercial tethered headsets were released by Oculus, the HTC Vive and PlayStation VR, setting off a new wave of application development.

3D cinema has been used for sporting events, pornography, fine art, music videos and short films. Since 2015, virtual reality has been installed onto a number of roller coasters and theme parks.

VR can simulate real spaces for workplace occupational safety and health purposes, educational purposes, and training purposes. It can be used to provide learners with a virtual environment where they can develop their skills without the real-world consequences of failing. It has been used and studied in primary education, military, astronaut training, flight simulators and driver training.

The first fine art virtual world was created in the 1970s. As the technology developed, more artistic programs were produced throughout the 1990s, including feature films. When commercially available technology became more widespread, VR festivals began to emerge in the mid-2010s. The first uses of VR in museum settings began in the 1990s, seeing significant increase in the mid-2010s. Additionally museums have begun making some of their content

virtual reality accessible. Immersive VR engineering systems enable engineers to see virtual. prototypes prior to the availability of any physical prototypes.