Unit-5

Emerging Technologies :- Emerging technologies are new and advanced technologies that are currently developing or will become important in the near future and have the potential to change the way we live, work, and interact.

In simple words:
Emerging Technologies = New technologies shaping the future.

Emerging technologies are rapidly developing technologies that can transform industries, society, and human life.
These technologies have potential to improve efficiency, intelligence, sustainability, and decision-making.

Augmented Reality :- Augmented Reality (AR) is a technology that adds digital objects (like images, text, or animations) on top of the real world.

Augmented reality overlays digital information (images, text, sounds) on the real-world environment using devices like smartphones, tablets, or AR glasses.

AR = Real world + Digital Information

- How Augmented Reality Works ?
  (i) Camera captures the real-world view
  (ii) Software adds digital objects on the screen.
  (iii) You see both real + virtual together

- Devices used : Mobile phones
  Tablets
  AR glasses

➤ Features of Augmented Reality :-

- Work in real time
- Combines real and virtual world
- Interactive and user-friendly
- Uses camera and sensors
- Enhances user-experience

➤ Limitations of Augmented Reality :-

- Requires high processing power
- Limited Battery life
- Privacy concerns
- Expensive hardware

➤ Application Areas of AR :-

- Education (interactive learning)
- Gaming (Pokemon Go)
- Medical Training
- Retail (virtual try-ons)
- Navigation Systems

Virtual Reality (VR)

Virtual Reality creates a fully virtual and immersive environment that users can interact with using VR headsets.

- Features of VR :
  (i) Fully immersive experience
  (ii) Artificial computer-generated environment
  (iii) Uses headsets and motion sensors

- Limitations of VR :
  (i) Motion sickness
  (ii) High cost of equipment
  (iii) Requires powerful hardware

- Application areas :
  (i) Gaming & entertainment
  (ii) Medical simulations
  (iii) Flight training
  (iv) Virtual tours
  (v) Education & training

Grid Computing

Grid computing connects multiple computers to work together as a single powerful system to solve complex problems.

- Features of grid computing :- (i) Resource sharing
  (ii) High computing power
  (iii) Distributed processing

- Limitations of grid computing :- (i) Network Dependency
  (ii) Security challenges
  (iii) complex management

- Application areas :- (i) Scientific Research
  (ii) Weather forecasting
  (iii) Medical research
  (iv) Financial Modelling

Green Computing

Green Computing focuses on environment-friendly computing by reducing energy consumption and electronic waste.

- Features of Green Computing :- (i) Energy efficient systems
  (ii) Reduced carbon footprints
  (iii) Eco-friendly hardware

- limitations :- (i) High initial cost (iii) Performance trade-offs
  (ii) Limited awareness

- Application Areas :- (i) Energy efficient data centers
  (ii) Cloud computing (iii) Power-saving devices

Big Data Analytics

Big data analytics deals with analyzing huge volume of data to discover patterns, trends, and useful information.

- Features :- (i) Handles large, complex data
  (ii) High-speed data processing
  (iii) Supports decision making

- Limitations :- (i) Data privacy issues
  (ii) High storage cost
  (iii) Requires skilled professionals

- Application areas :- (i) Healthcare analytics
  (ii) Business Intelligence
  (iii) Social media analysis
  (iv) Fraud detection
  (v) Weather prediction

Quantum Computing

Quantum computing uses quantum bits (qubits) instead of traditional bits to perform extremely fast calculations.

- Features :- (i) High speed processing (ii) Use Quantum Mechanics
  (iii) Solves complex problems quickly

- Limitations :- (i) Very expensive (ii) Still in development stage
  (iii) Unstable systems

Q) Brain-Computer Interface (BCI)

BCI enables direct communication between the human brain and a computer without physical movements.

- Features :
  (i) Reads brain signals
  (ii) Enables mind controlled actions
  (iii) Helps disabled users

- Limitations :
  (i) Ethical concerns
  (ii) High cost
  (iii) Complex technology

- Application areas :
  (i) Medical rehabilitation
  (ii) Assistive technology for disabled people
  (iii) Gaming & research
  (iv) Neuro-science studies