TIMELINE SNAPSHOT

Year	Key Milestone
1995–2000	Rise of mobile computing and the internet boom
2006	Launch of Amazon Web Services – start of cloud revolution
2012	Breakthrough in Deep Learning (ImageNet competition)
2015	OpenAI founded; deep learning becomes mainstream
2018	First commercial 5G rollouts begin
2020–2023	IoT boom; widespread AI adoption (e.g., GPT-3, Tesla Autopilot)
2024	Generative AI becomes mainstream (e.g., ChatGPT, Sora, Midjourney)
2025+	Early 6G research, Quantum AI, AI-driven drug discovery, neuromorphic chips

What Are Emerging Technologies?

Technologies in early development or adoption stages that are expected to have disruptive and transformative impact on society, industry, and governance.

Notable Experts:

- Clayton Christensen – Coined "Disruptive Innovation"
- Geoffrey Moore – Popularized the Technology Adoption Lifecycle
- Jackie Fenn (Gartner) – Creator of the Gartner Hype Cycle

Gartner Hype Cycle (est. 1995)

A graphical tool used by businesses and governments to assess technology maturity and potential risks. Helps decision-makers avoid the hype and invest wisely.

2024 Examples on the Hype Cycle:

Stage	Technologies
Innovation Trigger	Neuromorphic computing, Quantum networking
Peak of Inflated Expectations	AI agents (AutoGPT), Digital humans
Trough of Disillusionment	Blockchain for government systems
Slope of Enlightenment	Edge AI, Generative Design tools

Stage	Technologies
Plateau of Productivity	Computer vision, Cloud ML APIs

Technology Adoption Curve

Maps user adoption of new tech:

- *Innovators* (2.5%): Startups, universities
- *Early Adopters* (13.5%): High-tech enthusiasts
- *Early Majority* (34%): Schools, SMEs
- *Late Majority* (34%): Local governments, traditional industries
- *Laggards* (16%): Rural or low-tech sectors

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Subfields and Definitions

Field	What It Does	Current Examples (2024–2025)
AI	Mimics human thinking	Siri, Replika, ChatGPT
ML	Learns patterns from data	Netflix recommendations, Spotify
Deep Learning	Uses neural nets for complex tasks	Tesla Autopilot, DALL·E, Sora AI
NLP	Understands & generates language	ChatGPT-4, Meta LLaMA 3
Generative AI	Creates content (text, art, video, code)	Midjourney, Sora, Claude, Gemini

Notable People in AI

- Alan Turing – Theoretical father of AI (Turing Test)
- Geoffrey Hinton – "Godfather of Deep Learning"
- Yoshua Bengio & Yann LeCun – Pioneers of modern neural networks
- Sam Altman (OpenAI) – Leader in generative AI development

Current AI Innovations (2024–2025)

- Sora by OpenAI – Video generation from text
- Gemini by Google DeepMind – AI for reasoning and multimodal tasks
- Anthropic Claude 3 – Safer, explainable AI assistant
- Stability AI – Open-source image and video generation tools

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Ethical Issues in AI

- Bias in training data (e.g., racial bias in facial recognition)
- Transparency ("black box" decisions by large models)
- Accountability (who is responsible when AI fails?)
- Deepfakes (identity manipulation and fake news)
- Surveillance (China's social credit system, privacy violations)

INTERNET OF THINGS (IoT)

Key Concepts

Definition: The IoT is a network of interconnected physical devices (sensors, machines, appliances) that collect and exchange data via the internet.

Notable Applications

Domain	Example System	Local Example (Philippines)
Smart Homes	Lights, AC, door locks controlled via apps	PLDT Home devices, Xiaomi Mi Home
Smart Cities	Real-time traffic, pollution, water usage	QC smart traffic project
Agriculture	Soil moisture sensors, drone imaging	Smart rice farms (IRRI)
Health	Wearables for heart rate, oxygen, sleep	Fitbit, Huawei Health monitoring
Retail	Smart shelves, RFID for inventory	SM Malls' real-time foot traffic sensors

IoT Protocols (2024)

- MQTT: Lightweight communication
- ZigBee, LoRaWAN: Low-power wireless for long distances

- Bluetooth LE: Personal devices
- NB-IoT: Narrowband network for remote sensors

Upcoming Innovations

- TinyML: Machine learning on low-power microcontrollers
- IoT + Blockchain: Secure identity and communication
- Self-healing IoT systems: Auto-repairing networked devices

5G AND FUTURE NETWORK TECHNOLOGIES

What is 5G?

Fifth-generation mobile network offering:

- 10x faster speeds than 4G
- Ultra-low latency (1–10 ms)
- Massive simultaneous device connections

Launched in PH:

- Globe and Smart began 5G rollout in 2021–2022 in NCR, Cebu, and Davao.

Use Cases in 2024–2025

Application	How 5G Helps
Telemedicine	Real-time video, diagnostics, robotic surgery
Autonomous Vehicles	Split-second data for sensors and AI
Industrial Automation	Smart factories, real-time QC, robotics
Cloud Gaming/AR/VR	Lag-free streaming and immersive experiences

Notable Terms

- Network Slicing: Dividing a single network into optimized virtual networks
- Massive MIMO: Use of many antennas for faster data delivery
- mmWave: High-frequency spectrum enabling ultra-fast speeds (but short range)

What’s Next? (6G and Beyond)

Feature	Future Goal
6G Timeline	Expected trials by 2028, commercial by 2030
Tech Highlights	Terahertz spectrum, AI-native networks
Holographic Comm	Real-time 3D projections in education, health
AI-driven Networks	Self-optimizing and autonomous infrastructure

Countries Leading 6G Research:

- South Korea, Japan, Finland, United States, China

LOCAL CONTEXT: WHY THIS MATTERS TO THE PHILIPPINES

- Smart agriculture can boost productivity in rural Luzon and Visayas
- AI + IoT could improve disaster detection and response (e.g., typhoons, earthquakes)
- 5G enables inclusive healthcare access via remote diagnosis in rural clinics
- IoT sensors in Cebu, Baguio, and Davao already monitor traffic and environment

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INTEGRATED THINKING: SYNERGY OF TECHNOLOGIES

Example: Smart Hospital System (2025)

- AI predicts patient needs from medical records
- IoT monitors vitals via wearable patches
- 5G transmits data instantly to ER teams
- Hype Cycle helps hospitals assess which systems are ready to adopt

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EXAM STRUCTURE RECAP

Type	Description
MCQs	50 items (distributed by topic)

Type	Description
Essay Questions	5 total – 1 per topic + 1 integrated
Coverage	Definitions, use cases, ethics, emerging trends

ESSAY QUESTIONS – PREPARATION POINTS

1. Emerging Tech Evaluation

- Define Hype Cycle and Adoption Curve.
- Example: Place blockchain voting or metaverse education on the curve.

2. AI Ethics

- Case study: Predictive policing or ChatGPT in college.
- Discuss transparency, bias, consequences, and suggested guidelines.

3. IoT Application

- Design a simple smart flood detection system in Cebu or Marikina.
- Include sensors, alerts, connectivity, and power supply.

4. 5G Impact

- Compare impact of 5G on healthcare and transportation.
- Discuss cybersecurity, data sovereignty, and access equity.

5. Comprehensive

- Integrated healthcare: AI + IoT + 5G in a provincial hospital
- Address benefits (real-time monitoring), risks (data leaks), and implementation strategy.