10M

Generic block diagram of IOT device.

1. What is IOT? Write characteristics of IOT system.
2. Explain domain specific IOT applications in smart city, energy, logistics & retail.
3. Explain IOT protocols with a neat diagram.
4. Explain IOT levels & templates with example.
5. Discuss the role of big data analytics in IOT with use cases.
6. Explain embedded systems in IOT with example
7. Explain software defined ntw in detail with architecture
8. Compare SDN and NFV for IOT deployment.
9. Discuss NFV architecture & its importance in IOT ntwo.
10. Explain IOT system management using YANG, NETCONF, NETOPEER.
11. Discuss SNMP protocol for IOT device.
12. Explain in detail M2M communication with examples.
13. Differentiate b/w IOT & M2M communication models.
14. ~~Discuss~~ Explain interoperability challenges in IOT.
15. Compare IOT & M2M wrt connectivity, applications & scalability.

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1) What are environmental threats? Explain any two threats to the environment, by stating the causes & impacts for each threat.

-> Environmental threats are complex and multifaceted issues that impact the health of our planet and its inhabitant. These threats are result from human activities, unsustainable resource consumption and industrialization.

Threats to Environment

1) Resource Depletion

Causes: • Overconsumption: Rapid industrialization and consumer demand increase the exploitation of finite resources.
• Unsustainable mining & drilling: - Extracting fossil fuels, minerals & groundwater faster than they can naturally replenish.
• Deforestation - Excessive logging for timber, paper and agriculture contributes to soil degradation & desertification.

Impacts: • water scarcity: overuse of freshwater sources leads to shortages, particularly in arid regions.
• Energy crises - Fossil fuel depletion raises energy costs & contributes to geopolitics conflicts.
• Soil degradation: Unsustainable farming depletes nutrients, reducing agricultural productivity.

2) Pollution

causes: • Industrial waste: Factories release toxic chemicals into the air, water & soil.
• Plastic Pollution: Single use plastic clog oceans, harm marine life, & take centuries to degrade.

- Agricultural Runoff - Excess fertilizers & pesticides contaminate water supplies
- Vehicle emissions - Transportation contributes to smog, acid rain, and respiratory diseases

Impacts: • Air pollution - leads to respiratory diseases, heart conditions, and premature deaths
- Water pollution - Contaminates drinking water & destroys aquatic ecosystem
- Soil contamination - Reduces agricultural productivity and introduces toxins into the food chain
- Global plastic crisis - Microplastics have entered the food chain, posing risks to human & animal health

2> List and explain the key characteristics of sustainable business practice. Give some examples of companies leading in sustainability

→ Sustainable business practices focus on minimizing environmental harm, improving social well being, and ensuring long term economic growth

key characteristics of Sustainable business practices

1) Circular Economy model - Shifts from a linear 'take-make-dispose' economy to a regenerative model where materials are reused, recycled and repurposed
2) Renewable Energy adoption - Businesses invest in solar, wind & hydropower to reduce dependence on fossil fuels
3) Ethical Labor Practices - Companies ensure fair wages, safe working conditions and equal opportunities for employees
4) Sustainable supply chains - Business prioritize environmentally friendly materials, ethical sourcing & low carbon logistics
5) Waste Reduce strategies - Business reduce plastic packaging, implement recycling programs & promote reusable products

leading in sustainability

Examples of companies Leading in Sustainability

1) Tesla: Invests in EVs, solar energy, & battery storage to transition away from fossil fuels
2) Patagonia: A sustainable fashion brand that uses recycled materials & repairs old products to reduce waste
3) Unilever: Implements sustainable sourcing, reduces plastic waste, and invests in fair labor practices
4) IKEA: Plans to be a fully circular business by 2030, using renewable materials and offering furniture take-back program

3) List the various steps involved in transitioning from BAU to sustainable development & explain the following in the same content:
   a) Environmental Stewardship
   b) Challenges in transitioning to sustainability

→ For business to successfully transition from BAU to sustainable development, they need to undergo major operational & cultural changes. This transition involves:

* Environmental Stewardship
* Economic Inclusiveness
* Fair Governance & Corporate Responsibility
* Challenges in Transitioning to Sustainability.

a) Environmental stewardship:

→ Carbon Neutrality Goals: Companies commit to reducing or offsetting their carbon emissions.
→ Sustainable Product Design: Developing biodegradable, recyclable, or modular products to minimize waste.
→ Eco-friendly Infrastructure:- Constructing green buildings, using energy-efficient appliances, and investing in carbon capture technologies.

b) Challenges in Transitioning to Sustainability:

→ Initial high costs: Investments in renewable energy, sustainable materials, and ethical labor practices can be expensive

→ Resistance to change: Traditional businesses may be reluctant to change well-established but unsustainable models
→ Market competition: Companies fear losing price competitiveness if they increase production costs for sustainability efforts
→ Lack of consumer awareness - Many consumers still prioritize cheap, convenient products over sustainable alternatives

4) Illustrate the various nature based solutions to mitigate climate change
→ 1) Protection of Natural Carbon Sinks: Forests, wetlands, & oceans absorb atmospheric CO_2. Preserving these ecosystems prevents further emissions from deforestation & degradation
2) Afforestation & Reforestation: Could mitigate up to 7 Pg CO_2 e annually by 2030. However, socio-ecological complexities must be considered to avoid negative impact
3) Broader Restoration Scope: Beyond forests, restoring grasslands & wetlands is also critical
4) Reduced/No-Tillage: Conserves SOC in upper soil layers, although initial carbon losses in subsoils may occur before long-term gains are realized
5) Fertilizer Optimization: Lowering nitrogen input and using precision agriculture can reduce emissions
6) Climate-Friendly Practices: Crop rotations, herbaceous cover, minimal tillage & organic fertilizers
7) Microbial Inhibitors and Fertilization: Enhance anaerobic oxidation of CH_4
8) Nitrification Inhibitors: Compounds like NBPT and DMPSA (types of fertilizers) are effective without harming yield