AI Unit 1: 12 Application-Level Questions (20 Marks Each) - Summary

Q1. Natural Language Understanding in Smart Healthcare Assistant

NLU helps AI understand spoken/written human language. It detects intent (e.g., book appointment), entities (e.g., medication), and context.

Used in healthcare assistants to automate tasks like appointment booking, symptom interpretation. Enables personalized, intelligent interaction.

Q2. Mimicking Human Behavior vs Acting Rationally

Mimicking behavior focuses on human-like interaction (e.g., companion robot), while rational systems aim for logical, optimal outcomes (e.g., route planner).

Human-like AI = natural interaction. Rational AI = goal achievement. Both differ in goals, design, and application.

Q3. Expert Systems in AI and Their Use in Diagnosis

Expert systems replicate domain-specific expertise using rules and logic. Components: Knowledge base, inference engine, user interface.

Examples: MYCIN (medical), DENDRAL (chemistry), PROSPECTOR (geology), INTERNIST (medicine). Useful in rural healthcare.

Q4. NLU + Semantic Modeling in E-Governance Assistants

NLU interprets queries. Semantic modeling gives meaning to terms/context (e.g., 'status' of pension).

Together, they help AI grasp human intent, making digital assistants accurate and interactive.

Q5. Machine Learning in Recommendation Engines

ML allows systems to learn from user behavior (ratings, time spent). Improves suggestions over time.

Used in learning platforms (Coursera, Udemy) to personalize content based on experience.

Q6. Neural Networks & Genetic Algorithms in Traffic Systems

Neural Networks predict traffic using historical data. Genetic Algorithms optimize signal timings via evolution-like search.

Together, they help in congestion reduction and smart signal control.

Q7. Risk-Benefit Analysis of AI in Healthcare

Benefits: Accuracy, access, speed. Risks: Bias, safety failure, surveillance, job loss, cyber threats.

Ethical deployment requires fairness, transparency, and safety mechanisms.

Q8. Agents and Environments in Delivery Drones

Drone = agent; city = environment. Sensors perceive, actuators act. Decision-making uses percepts + real-time data.

Enables drones to adapt, navigate, and solve problems mid-flight.

Q9. Rationality in Self-Driving Cars

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Rational agents choose best actions given current data. Car decisions (e.g., braking for pedestrian) aim to maximize safety + efficiency.
Depends on performance measure, percepts, actions, knowledge.

Q10. PEAS for Autonomous Taxi

PEAS = Performance (safe ride), Environment (traffic, roads), Actuators (brake, steer), Sensors (GPS, cameras).
Defines everything the taxi agent needs to act intelligently.

Q11. Properties of Task Environments in Smart Agriculture

Properties include observability, determinism, dynamics, agents. Drones face partial observability, dynamic weather, continuous navigation.
Affects perception, control, planning strategies.

Q12. Agent Programs for Warehouse Robots

Types:
- Simple Reflex: if-then rules
- Model-Based: memory of past
- Goal-Based: plans to reach goal
- Utility-Based: optimizes outcomes

Utility-based best for trade-offs and efficiency in warehouse.