1. Explain ERP System Architecture and its Technological Infrastructure. (15 Marks)

ERP System Architecture defines how ERP software components, hardware, databases, and users interact to support enterprise-wide operations.

Core Layers of ERP Architecture

1. **Presentation Layer**

   - Provides the user interface (GUI or web-based UI).

   - Allows users to enter, view, and modify data.

   - Examples: Web browsers, desktop clients.

2. **Application Layer**

   - Contains business logic and processing rules.

   - Executes workflows such as order processing, payroll calculation, and inventory updates.

   - Ensures business rules are enforced consistently.

3. **Database Layer**

   - Centralized repository of organizational data.

   - Ensures data integrity, consistency, and security.

   - Supports real-time transaction processing.

Technological Infrastructure

- Servers (Application & Database)

- Operating systems

- Middleware

- Network infrastructure

Conclusion

A well-designed ERP architecture ensures scalability, reliability, performance, and seamless integration across business functions.

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2. Explain Client/Server Architecture used in ERP systems. (15 Marks)

Client/Server Architecture splits ERP processing between user machines (clients) and centralized servers.

Types

Two-Tier Architecture

- Client communicates directly with the database server.

- Simple but limited scalability and security.

- Used in early ERP systems.

Three-Tier Architecture

- Client → Application Server → Database Server

- Business logic is placed in the application server.

- More secure, scalable, and flexible.

Advantages

- Centralized data control

- Improved performance

- Better system maintenance

Conclusion

Modern ERP systems predominantly use **three-tier client/server architecture**.

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3. Explain Service-Oriented Architecture (SOA) in ERP. (15 Marks)

Service-Oriented Architecture (SOA) is an approach where ERP functionalities are delivered as independent, reusable services.

Key Characteristics

- Loose coupling

- Reusable services

- Platform independence

- Standard communication protocols (XML, SOAP, REST)

Role of SOA in ERP

- Enables easy integration with third-party systems

- Supports customization without core modification

- Simplifies upgrades and maintenance

Conclusion

SOA increases ERP flexibility, interoperability, and long-term sustainability.

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4. Compare Cloud-based ERP and On-Premise ERP. (15 Marks)

Cloud-based ERP

- Hosted on vendor-managed cloud infrastructure.

- Accessed via internet.

- Subscription-based pricing.

- Automatic updates and maintenance.

On-Premise ERP

- Installed on company's own servers.

- High initial investment.

- Full control over data and security.

- Maintenance handled internally.

Conclusion

Cloud ERP is ideal for SMEs and growing firms, while On-Premise ERP suits large enterprises with strict compliance needs.

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5. Explain ERP Platforms and Databases in detail. (15 Marks)

ERP Platforms

- Operating Systems (Linux, Windows Server)
- Application Servers
- Middleware for communication

Databases in ERP

- Store transactional and master data
- Support high-volume processing
- Enable analytics and reporting

Popular ERP Databases

- Oracle Database
- SAP HANA
- Microsoft SQL Server
- PostgreSQL

Conclusion

Database performance directly impacts ERP efficiency and decision-making.

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6. Explain ERP and Web Integration. (15 Marks)

ERP and Web Integration connects ERP systems with web applications and external platforms.

Methods

- Web services

- APIs

- Browser-based ERP portals

- E-commerce integration

Benefits

- Real-time online transactions

- Improved customer and supplier interaction

- Remote system access

Conclusion

Web integration extends ERP beyond organizational boundaries.

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7. Explain Security mechanisms in ERP Systems. (15 Marks)

ERP Security Features

1. User authentication

2. Role-based access control

3. Data encryption

4. Audit trails

5. Backup and disaster recovery

Importance

- Protects sensitive business data

- Prevents unauthorized access

- Ensures legal and regulatory compliance

Conclusion

Security is a critical success factor in ERP implementation.

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8. Explain Customization and Interoperability in ERP Systems. (15 Marks)

Customization

- Adapting ERP to organizational needs
- Types:
  - Configuration (recommended)
  - Custom coding (risky if excessive)

Interoperability

- Ability of ERP to communicate with other systems
- Enabled using:
  - SOA
  - APIs
  - Middleware

Conclusion

Controlled customization and strong interoperability ensure ERP flexibility without system instability.

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9. Explain SAP ERP System in detail. (15 Marks)

SAP ERP is a globally leading enterprise resource planning solution used by large and complex organizations.

Key Characteristics

- Modular architecture (Finance, HR, Sales, Production, SCM)

- Uses centralized database (SAP HANA)

- Supports real-time analytics

- Industry-specific solutions available

Advantages

- High scalability

- Strong integration across modules

- Robust reporting and compliance support

Limitations

- High implementation cost

- Requires skilled professionals

Conclusion

SAP ERP is best suited for large enterprises with complex business processes.

10. Explain Oracle, Microsoft Dynamics, and Odoo ERP systems in detail. (15 Marks)

Oracle ERP

- Cloud-first ERP solution

- Strong financial management and supply chain modules

- Advanced analytics and automation

- Suitable for multinational enterprises

Microsoft Dynamics

- Integrates seamlessly with Microsoft tools (Excel, Outlook, Teams)

- User-friendly interface

- Modular and flexible

- Ideal for mid-sized organizations

Odoo

- Open-source ERP platform

- Highly customizable

- Cost-effective

- Best for startups and SMEs

Conclusion

ERP selection depends on organization size, budget, complexity, and scalability needs.