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CHAPTER 1 - AUTOMATED BUSINESS PROCESS

Process – Set of activities which uses input & produces output.
Business process – is a coordinated & standardized set of activities performed by people / machines to achieve a business objective & create value for customers. Ex. completing a sale, purchasing raw materials, accounting etc.

Categories of Business Processes

Operational Processes	Supporting Processes	Management Processes
- Deal with core business & value chain. - Represents essential business activities that accomplish business objectives. - Deliver value to customers directly. Ex. Generating revenue - order to cash cycle, Procurement - purchase to Pay cycle. **Order to cash cycle :-** - Set of business processes that involve receiving & fulfilling customer request for goods / services. **Contains multiple sub-Process like;** - Customer order - Order Fulfilment - Delivery note - Invoicing - Collections - Accounting	- Back / support core processes & functions. - Do not provide value to customers directly. - Improves efficiency of the enterprise. Ex. Accounting, Human Resource management, information technology. **Human Resource Management** Includes : - - Recruitment & Staffing - Personnel management - Training - Time & attendance - Payroll management - Appraisal management	- Measure, monitor & Control activities related to business procedures. - Do not provide value to customers directly. - Improves efficiency of the enterprises. Ex. Strategic planning, Budgeting, governance **Budgeting** Includes, - Vision - Strategic plan - Business goals - Revenue projections - Cost projections - Profit projections - Board approval - Budget review

Business Process Automation

- Is the technology enabled automation of activities or services that accomplish a specific function including sales, purchase, Human Resources etc.
- BPA is the tactic a business uses to automate processes to operate efficiently & effectively.
- BPA is the tradition of analyzing, documenting, optimizing & then automating business process.

Benefits	Steps in implementing BPA
- Time Saving - Reduced costs - Improved operational efficiency - Quality & consistency - Visibility - Reliability	(1) Define why we plan to implement a BPA (primary purpose) (2) Understand the rules / regulations under which enterprise needs to comply with. (Rules of engagement i.e. BPA should be as per applicable laws & policies) (3) Document the process we wish to automate (4) Define the objectives / goals to be achieved by implementing BPA(SMART Principle) (5) Engage the Business process consultant (6) Calculate the ROI for project (7) Developing the BPA (8) Testing the BPA

Risks & Enterprise Risk Management (ERM)

Risk: Is any event that may result in a significant deviation from a planned objective resulting in an unwanted negative consequence.

Types of Business Risks	Enterprise Risk Management
- Strategic - Financial - Regulatory - Reputational - Operational	Enterprise Risk Management (ERM) may be **defined as a process**, effected by an entity's Board of Directors, management and other personnel, designed to **identify potential events that may affect the entity, and manage risk to be within its risk appetite,** to provide reasonable assurance regarding the achievement of entity objectives.

Components of ERM	Benefits of ERM
(1) Internal Environment (2) Objective Setting (3) Event Identification (4) Risk Assessment (5) Risk Response (6) Control Activities (7) Information & communication (8) Monitoring	1) Align risk appetite & strategy 2) Link growth, risk & return 3) Minimize operational surprises & losses 4) Seize opportunities 5) Enhance risk response decisions 6) Identify & manage cross-enterprise risk 7) Provide integrated responses to multiple risks

Risks in Business Process Automation

Risks in BPA	Objectives of BPA / Success Factors for BPA
- Input & Access - Processing - Output - Data - Data transmission - Infrastructure (facility)	- Confidentiality - Integrity - Availability - Timeliness

Controls

Control is defined as policies, procedures, practices and organization structure that are designed to provide reasonable assurance that business objectives are achieved and undesired events are prevented or detected and corrected.

Based on mode of implementation controls can be	Components of Internal controls as per SA-315	Limitation of Internal Control System
- Manual - Automated - Semi – Automated	1) Control Environment 2) Risk Assessment 3) Control Activities 4) Information & communication 5) Monitoring of controls	- Management's consideration that the cost of an internal control doesn't exceed the expected benefits to be derived. - most internal controls do not tend to be directed at transactions of unusual nature - circumvention of internal controls through collusion with employees - person responsible for exercising an internal control could abuse that responsibility - Manipulations by management

Diagrammatic representation of Business Process

Flowcharts		Data flow diagram (DFD)
- Flowcharts are used in designing & documenting simple processes or programs. - Before developing any program developer first prepare flowchart & on the basis of flowchart developer do coding.		- Is a graphical representation of the flow of data through business process (i.e. between different functional department). - It represents the flow of data from source to destination. - DFD is a graphical representation for logical flow of data.
Advantages of flowcharts	**Limitations of flowcharts**	**Main Symbols used in DFD**
- Quicker grasp of relationships - Effective Analysis - Communication - Documentation - Efficient coding - Program debugging - Efficient Program maintenance	- Complex logic - Modification - Reproduction - Link between conditions & actions - Standardization	- External Agent (Entity) - Process - Data store - Data flow **Diagrammatic Representation of** (1) Customer order fulfilment (2) Order to cash (3) Procure to pay

Risks & controls for Specific Business Process

In computer systems controls should be checked at three levels
Namely;

1) **Configuration**
   - Refers to the way a software system is setup
   - Is a process of defining options that are provided.
   - Will define how software will function & what menu options are displayed.

   Examples of configuration
   - User activation & deactivation
   - User access & privileges
   - Password management

2) **Masters**
   - Refers to the way various parameters are setup for all modules of software.
   - Masters are setup first time during installation.

   Examples of masters
   - Vendor master, customer's master, inventory master.

3) **Transactions**
   - Refer to the actual transactions entered in the application software.

   Example
   - Sales, purchase, payment transactions

Risks & control objectives for various Processes

Procure to pay	Order to cash	Inventory cycle	Human Resources
Is the process of obtaining & managing the raw materials needed for manufacturing a product or providing a service	1. Customer order is documented; 2. Order is fulfilled or service is scheduled; 3. Order is shipped to customer or service is performed; 4. Invoice is created and sent to customer; 5. Customer sends payment /Collection; and 6. Payment is recorded in general ledger.	Is a process of accurately tracking on – hand inventory levels for an enterprise **Phases of inventory cycle** (1) The ordering phase (2) The production phase (3) The finished goods & delivery phase	Refers to human resources management & covers all the stages of an employee's time within a specific enterprise. **Stages of HR cycle** (1) Recruiting & on boarding (2) Orientation & career planning (3) Career development (4) Termination or transition

Risks & control objectives for various Processes

Fixed Assets	General ledgers
Process ensures that all the fixed assets of the enterprise are tracked for various purposes Steps of Fixed Assets process are as follows :- (1) Procuring an asset (2) Registering / Adding an asset (3) Adjusting the assets (4) Transferring the Assets (5) Depreciating the Assets (6) Disposing the Assets	Steps in general leader process flow are as follows : (1) Entering financial transactions into the system (2) Reviewing transaction (3) Approving transaction (4) Posting of transaction (5) Generating financial report

Regulatory & Compliance requirement

The companies Act, 2013	Information Technology Act, (IT Act)		
	Advantages of Cyber laws / IT Act, 2000.	**Examples of computer recreated offences**	**Privacy**
(1) Section 134 on financial Statement, Board's report etc. (2) Section 143 on powers & duties of auditor's & auditing standards.	- email would now be- a valid and legal form of communication in India - carry out electronic commerce - Digital signatures given legal validity and sanction - entry of corporate companies in the business of being Certifying Authorities - allows Government to issue notification on the web - enables the companies to file any form, application or any other document with any office owned or controlled by the appropriate Government in electronic form - addresses the important issues of security	- Harassment via fake public profile on social networking site. - Email account Hacking - Credit card fraud - Wed Defacement - Introducing viruses, worms, backdoors, Rootkits, Trajan's, Bugs. - Online sale of illegal articles - Phishing & Email Scams	The **main principles** on data protection and privacy enumerated under the IT Act, 2000 are: - defining 'data', 'computer database' - creating civil liability - creating criminal liability - declaring any computer as a protected system - imposing penalty for breach of confidentiality and privacy - setting up of hierarchy of regulatory authorities **Sensitive personal Data / Information** S/43 A of IT Act, 2000 define a data protection Framework for the processing of digital data by body corporate. Body Corporate is defined as "Any company and includes a firm, sole proprietorship or other association of individuals engaged in commercial or professional activities." Rule 2(i) defines personal information as "information that relates to a natural person which is capable of identifying such person." Rule 3 defines sensitive personal information as: • Passwords • Financial information • Physical/physiological/mental health condition • Medical records and history; and • Biometric information

CHAPTER – 2 FINANCIAL & ACCOUNTING SYSTEMS

Concepts in computerized Accounting Systems

1) Types of data

1) Master Data
- It is relatively permanent data that is not expected to change again & again frequently.
- Not typed by the user, but created by data base Administrator

(To maintain standardization)

Types of master data
(i) Accounting master data
(ii) Inventory master data
(iii) Payroll master data
(iv) Statutory master data

2) Non – master Data
- It is a data which is expected to change frequently, again & again & not a permanent data.
- Typed by the user
- Ex. Amounts, Date

2) Voucher Types

Voucher
- Is a documentary evidence of a transaction

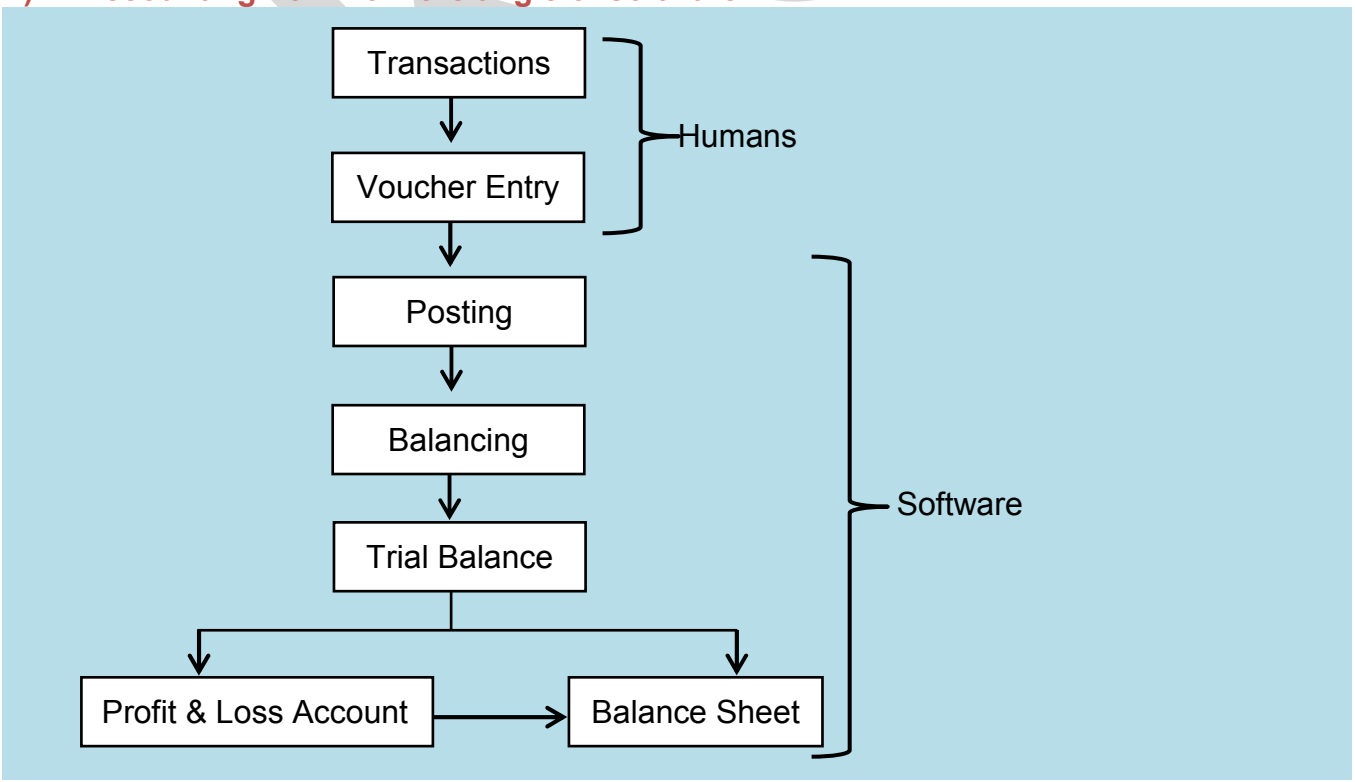
Types of voucher used in accounting system
1) Contra
2) Payment
3) Receipt
4) Journal
5) Sales
6) Purchase
7) Credit Note
8) Debit Note
9) Purchase order
10) Sales order
11) Stock Journal
12) Physical Stock
13) Delivery Note
14) Receipts Note
15) Memorandum
16) Attendance
17) Payroll

3) Voucher Number

- A voucher no. or a document no. is a **unique identity** of any voucher / document
- To identity / search document

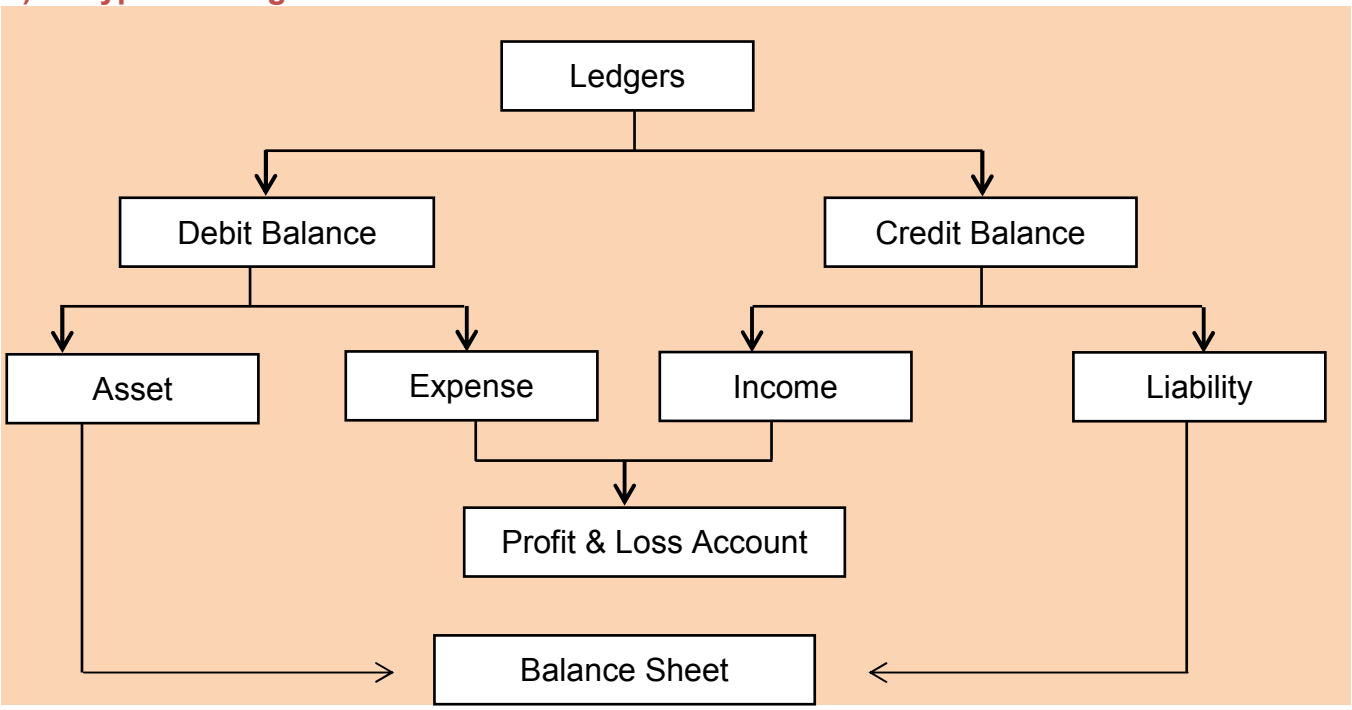
Characteristics / Qualities / Peculianties of Voucher no.
(1) Must be **Unique**
(2) Every voucher type shall have a separate numbering series
(3) May have **prefix / Suffix / both**
(4) Numbered serially
(5) Recorded in **chronological order.**

4) Accounting flow from the angle of software



Last five steps performed by software with **high speed and accuracy**

5) Types of ledgers



6) Concept of grouping of ledgers

1) Is used for preparation of Reports i.e. P&L, B/S
2) At the time of creation of any new ledger, It must be placed under a particular group.
3) There are four basic groups in accounting i.e. Income, expenses, Asset, liability.

Technical concepts in computerized financial & accounting systems

(A) Working of any software thought front end & Back end module

- **Front End** (Act as Interface):

Part of the software which actually interacts with the user who is using the software.

- **Back End**(Actual Processing of data):

Part of the Software which does not directly interact with the user, but interacts with front end only.

(B) Installed Applications v/s Web Applications

There are two ways of using a software including Financial & Accounting Software

(i) Installed Applications are programs installed on the hard disc of the user's computer.
(ii) Web applications (Cloud based) are not installed on the hard disc of the user's computer. It is installed on a web server & it is accessed using a browser & internet connection.

Installed Application	v/s	Web Applications
- Data storage		- Installation & maintenance
- Data Safety		- Accessibility
- Performance		- Mobile Application

These days many organisations do not prefer to install financial & Accounting Applications on their own if Infrastructure but hosting their application on Internet & Outsource IT functions.

Integrated & Non – Integrated System

<table>
<tr><th>Non – Integrated System</th><th colspan="2">Integrated System (ERP System)</th></tr>
<tr><td rowspan="2">It is a system of maintaining data in a decentralized way, resulting in all the departments are working independently & using their own set of data.
- Purchase
- Production
- Marketing
- Accounting
- Human resource

Results in two major problems
- Communication gaps
- Mismatched Data</td><td colspan="2">- Fully Integrated Business management system that integrates core business processes
- Multi – module software system integrates entire enterprise into a single software using single integrated database.</td></tr>
<tr><td>Advantage of ERP System
(1) Ability to customize
(2) Integrate Business Operations with accounting & Financial reporting functions
(3) Eliminating errors
(4) Process huge volumes of data
(5) Strong reporting capabilities which help management & others in decision making.
(6) Data security & Application security
(7) Access & Segregation of duties controls</td><td>Features of an ideal ERP System
(1) Caters all types of needs
(2) Right data, Right time to right users
(3) Flexible enough to adapt to changes
(4) Single data base
Modules of ERP
- Manufacturing
- Financials
- Human Resources
- Supply chain management (SCM)
- Projects
- Customer relationship management (CRM)
- Data warehouse</td></tr>
</table>

Risks & Controls

Risks in ERP Environment	Risks associated & controls required in ERP System	Role based Access Control (RBAC)
Most risks in ERP Environment are related to data only - Total loss of data - Partial loss of data - Unauthorized changes in data - Partial / complete deletion of data - Leakage of information - Incorrect input of data	(1) Data Access (2) Data Safely (3) Speed of operation (4) Change in process (5) Staff Turnover (6) System Failure	- Is an approach to restricting system access to authorised users - Roles for staff are defined & access to the system can be given according to roles assigned **Types of Access** - Create – Allows to create data - Alter – Allows to alter data - View – Allows only to view data - Print – Allows to print data Above type of access can be allowed / disallowed for - Master date - Transaction data - Reports

Audit of ERP System

(i) Does the system process according to GAAP (Generally Accepted Accounting Principles) & GAAS (Generally Accepted Auditing Standards)?
(ii) Does it meet needs for reporting?
(iii) Does the system protect confidentiality & Integrity of information?
(iv) Does it have controls to process only authentic, valid & accurate transactions?
(v) System protected from unauthorized access?
(vi) Are user privileges based in Role based access?
(vii) Is there on ERP system administrator?
(viii) Are users trained?

Accounting Process Flow in Accounting Cycle

- Source Document
- Journal
- Ledger
- Trial Balance
- Adjustments
- Adjusted trial balance
- Closing entries
- Financial statements

Business Process modules in ERP

<table>
<tr><th>Financial Accounting module</th><th>Controlling module</th><th>Sales & Distribution module</th><th>Human Resource module</th></tr>
<tr>
<td>Features of Financial Accounting module
(i) Tracking of flow of financial data across the organisation
(ii) Creation of organisation structure
(iii) General ledger Accounting
(iv) Tax Configuration
(v) Accounts Payables
(vi) Accounts Receivables
(vii) Asset Accounting
(viii) Integration with other modules</td>
<td>- Coordinating, monitoring & optimizing all the processes
- Help in analysing actual figures with planned data
- Cost element & Revenue element
- Elements stored in financial Accounting module
Features of controlling module
(i) Cost element Accounting
(ii) Cost centre Accounting
(iii) Activity based Accounting
(iv) Product cost controlling
(v) Profit centre Accounting
(vi) Profitability Analysis</td>
<td>Key features of Sales & Distribution module
(i) Setting up organization structure
(ii) Assigning units
(iii) Defining price components
(iv) Setting up sales document type, tax related components
(v) Setting up customer master data
Sales & Distribution Process
(i) Pre-sales Activity
(ii) Sales order
(iii) Inventory sourcing
(iv) Material delivery
(v) Billing
(vi) Receipt from customer</td>
<td>(i) Employee master Data
(ii) <u>Objectives</u>
- Ensure least disputes
- Right utilization of manpower
- Keep track of employees efficiency
- Keep track of leave records
(iii) <u>Functions</u>
- Recruitment
- Personnel administration
- Training
- Attendance
- Payroll
- Promotion</td>
</tr>
<tr><th>Material management (mm) module</th><th>Quality management module</th><th>Production planning (PP) module</th><th>Project Systems module</th></tr>
<tr>
<td>- Manages material required, processed & Produced in enterprises
- Deals with movement of materials via other modules.

<u>Purchase process under MM Module</u>

- Purchase Requisition from Production Department
- Evaluation of Requisition
- Asking for Quotation
- Evaluation of quotations
- Purchase Order
- Material Receipt
- Issue of material
- Purchase Invoice
- Payment to Vendor</td>
<td>Quality management process
(i) Set Quality standards
(ii) Set Quality targets to be met
(iii) Quality management plan
(iv) Define how quality will be measured
(v) Measure quality
(vi) Identify issues, improvement & changes to be made.
(vii) Change requests are sent
(viii) Report level of quality achieved
(ix) Quality is checked at multiple points</td>
<td>(i) Includes software designed specifically for production planning & management
(ii) It collaborates with master data, sales planning, distribution resource planning, material requirement planning etc. to help in production management
Plant maintenance module
- It handles maintaining of equipment & enables efficient planning of production & generation of maintenance schedules
- It focuses on Prevention maintenance</td>
<td>(i) It is an integrated project management tool used for planning & managing projects
(ii) It has several tools that enables project management process such as cost & planning budget, scheduling, requisitioning of materials & services
Supply chain module (SCM)
- Used to provide information about movement of raw materials from supplier's place to organization & movement of finished goods from organisations place to customers place
- Provides tracking of raw material working progress & financial goods.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Customer relationship to management (CRM)
- Provides information to management as to the customer requirement, customer account balance, payment details etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Benefits of CRM module
(1) Improved customer relations
(2) Increase customer revenue
(3) Maximize up selling & cross- selling
(4) Better internal Communication
(5) Optimize minting</td>
</tr>
</table>

Various concepts of inventory Accounting

- Inventory stands for list of stock items intended for trading or consumption.
- All the transactions involving inventory are covered in this module

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Inventory Accounting Concepts

- Stock item
- Stock group
- Godown
- Unit of measure
- Re – order level
- Price levels
- Stock ageing
- Cost tracking
- Batch
- Expiry dates

Integration with other modules

Important points for integration of modules with financial & Accounting System ↓	Important points for integration with other modules ↓
• **Master data** across **all the modules** must be **same** and must be **shared** with other modules where-ever required. • **Common transaction data** must be **shared** with other modules where-ever required. • Separate voucher types to be used for each module for easy identification of department recording it. • Figures and transaction may flow across the department. Hence, it is necessary to design the system accordingly.	• Material Management Integration with Finance & Controlling (FICO) • Human Resource Module Integration with Finance & Controlling • Material Management Integration with Production Planning (PP) • Material Management Integration with Sales & Distribution (SD) • Material Management Integration with Quality Management (QM) • Material Management Integration with Plant Maintenance (PM)

Management information system

- It is a system which provides accurate, timely & meaningful data to manager's for decision making.

Type of information in an MIS Report / benefit of MIS / criteria of MIS

(1) Relevant
(2) Timely
(3) Accurate
(4) Structure

Data Analytics & Business Intelligence
BI in simple words refers to the process of collecting and refining information from many sources, analyzing and presenting the information in useful ways so that users can make better business decisions. From the perspective of decision making, BI uses data about yesterday and today to facilitate making better decisions about tomorrow.

Business Reporting & Fundamental of XBRL

Business Reporting	XBRL			
	Meaning	**XBRL Tagging**	**Basic purpose of XBRL / who uses XBRL**	**Important features of XBRL**
Is the public reporting of operating & Financial data by business enterprise or regular provision of information to decision makers within an organization to support them in their work. **Organizations communicate with their stakeholders about:** • Mission, vision, objectives, and strategy; • Governance arrangements and risk management; • Financial, social, and environmental performance **Importance of Business Reporting** • provide stakeholders with high- quality reports. • allows organizations to present detailed explanation of their business • helps stakeholders to assess organizational performance • better internal decision-making • successful management of the business	- Is a freely available & global standard for exchanging business information - One use of XBRL is to define & exchange financial information such as financial statement	XBRL Tagging is the process by which any financial data is tagged with the most appropriate element in an accounting taxonomy (a dictionary of accounting terms) that best represents the data	(1) Regulator (2) Companies (3) Governments (4) Data providers (5) Analysts & Investors (6) Accountants	(1) Clear definition (2) Testable business rules (3) Multi-lingual support (4) Strong software support

Applicable regulatory & compliance requirements

There may be two approaches for making compliances requiring accounting data.

(i) Using same software for accounting & tax compliance &

(ii) Using different software for accounting & tax compliance

Pros & cons of having single software for accounting & tax compliance

Particulars	Accounting & tax compliance software	Only tax compliance software
(1) Ease of software operation	Less	More
(2) Features & facilities	Less	More
(3) Time & efforts required	Less	More
(4) Accuracy	More	Less
(5) Cost	More	Less

CHAPTER 4 – E -COMMERCE, M COMMERCE & EMERGING TECHNOLOGY

E – Commerce & M-Commerce

Meaning	Differentiate between Traditional & E – Commerce		
- Sale / purchase of goods / services through electronic mode is e-commerce - Is a process of doing business electronically.	**Base for compares**	**Traditions commerce**	**E – commerce**
	Definition	Traditional commerce includes all those activities which encourage exchange, in some way or the other of goods / services which are **manual and non-electronic**	E-Commerce means carrying out commercial transactions or exchange of information, **electronically on the internet**
	Transaction processing	Manual	Electronically
	Availability	For limited time	24 *7* 365
	Nature of purchase	Goods can be inspected physically before purchase	Goods cannot be inspected physically before purchased
	Customer interaction	Face to face	Face to Screen
	Business Scope	Limited to particular area	Worldwide reach
	Payment	Cash, cheque, credit card	Credit card, fund transaction, COD
	Delivery of goods	Instantly	Takes time

Benefits of E – commerce		
To customer, individual, user	**To business, Seller**	**To Government**
• Convenience • Time saving • Various Options • Easy to find reviews • Coupon and Deals • Anytime Access • Reduction in costs	• Creation of new markets • Easier entry into new markets • Increased Customer Base • Reduction in costs ▪ overhead costs ▪ Advertising costs • Efficiency improvement	• Instrument to fight corruption • Reduction in use of ecologically damaging materials

Components of E – commerce

User	E – commerce vendors	Technology Infrastructure
Individual / organisation using e – commerce platforms	Organization / entity providing the user goods / services asked for E – commerce vendors further needs to ensure following for better, effective & efficient transaction: 1) E - commerce catalogue & Product display 2) Supplier & supply chain management 3) Marketing & loyalty programs 4) Warehouse operations 5) Shipping & Returns 6) Guarantees 7) Showroom & offline purchase	(1) Computer, servers & Database (2) Mobile Apps (3) Digital libraries (4) Data interchange (5) Internet / network (6) Web portal • Interface • Application • Front end (7) Payment gateway - Payment mode through which customers shall make payments. - like credit / debit card COD, Online bank, Payments etc.

Work flow diagram for E – commerce / steps of E – commerce	Risks associated with E – commerce	Controls		
		In e – business environment controls are necessary for	Ways to protect from risk	Control objectives
1) Customer login 2) Product / service selection 3) Customer places order 4) Payment gateway 5) Dispatch & shipping process 6) Delivery tracking 7) COD tracking	• Privacy and Security • Quality issues • Delay in goods and Hidden Costs • Needs Access to internet • Problem of anonymity • Repudiation of contract • Attack from hackers • Denial of Service	1) Users 2) Sellers / Buyers / merchants 3) Government 4) Network services providers 5) Technology service providers	• Educating the participant about the nature of risks • Communication of organizational policies to its customers • Ensure Compliance with Industry Body Standards • Protect your e-Commerce business from intrusion ▪ Viruses ▪ Hackers ▪ Passwords ▪ Regular software updates ▪ Sensitive data	• Prevent organizational costs of data Loss • Prevent loss from incorrect decision making • Prevent loss of Computer Hardware, Software and Personnel • Prevent from high costs of computer Error • Safeguard assets from un-authorized access • Ensure data integrity • System Effectiveness Objectives • System Efficiency Objectives

Architecture of network system / Types of Network Architecture

Types of Network Architecture		E – commerce Architecture vide internet			E – commerce Architecture vide M – commerce		
Two-tier **Presentation Tier (Client Application/Client Tier):** This is the interface that allows user to interact with the e-commerce / m commerce vendor. **Database Tier (Data Tier):** The product data / price data / customer data and other related data are kept here.	**Three-tier** **Presentation Tier:** Displays information related to services available on a website. **Application Tier:** It controls application functionality by performing detailed processing. **Database Tier:** This tier houses the database servers where information is stored and retrieved.	**Layer** **Client/ User Interface** **Application Layer** **Database Layer**	**Includes** Web Server, Web Browser and Internet. For example: where user buys a mobile phone from an ecommerce merchant Application Server and Back End' Server. For example - it includes - E-merchant - Reseller - Logistics partner The information store house, where all data relating to products, price it kept	**Purpose** This layer helps the ecommerce customer connect to ecommerce merchant. This layer allows customer to check the products available on merchant's website This layer is accessible to user through application layer	**Layer** **Client/ User Interface** **Application Layer** **Database Layer**	**Includes** Mobile Web Browser and Internet. For example: In example discussed above where user buys a mobile phone from ecommerce merchant it includes, - Mobile APP (Application) - User Application Server and Back End' Server. For example - it includes - E-merchant - Reseller - Logistics partner The information store house, where all data relating to products, price it kept	**Purpose** This layer helps the ecommerce customer connect to ecommerce merchant. This layer allows customer to check the products available on merchant's website This layer is accessible to user through application layer
Advantages • more users could interact with system • performance is higher because business logic and database are physically close • easy to setup and maintain	**Advantages** • more clients can have access to a wide variety of server applications . • Dynamic load balancing • Change management						
Disadvantages • Performance deteriorates if number of users' increases. • There is restricted flexibility	**Disadvantages** • requires complex and costly tools • Current tools are relatively						

	immature and are more complex. • More suitable for distributed applications						

Guidelines & laws governing E – commerce

Guidelines for E – commerce	Commercial laws governing – commerce	Special laws governing E – commerce
• Billing • Product guarantee / warranty • Shipping • Delivery • Return • Payment	• Income Tax Act, 1961 • Companies Act, 2013 • Foreign Trade (Development and Regulation) Act, 1992 • The Factories Act, 1948 • The Custom Act, 1962 • The Goods and Services Tax Act, 2017 (GST) • Indian Contract Act 1872 • The Competition Act, 2002 • Foreign Exchange Management Act (FEMA1999) • Consumer Protection Act, 1986	• Information Technology Act, 2000 • Reserve Bank of India, 1932

Digital Payments

- Digital Payment is a way of payment which is made through **digital modes.**
- In digital payments, payer and payee both use digital modes **to send and receive money.**
- It is also called **electronic payment**.
- **No hard cash** is involved in the digital payments.
- All the transactions in digital payments are completed **online**.
- It is an **instant and convenient** way to make payments

Types of Digital Payment	Advantages	Disadvantages / Drawbacks
New methods 1) Unified payment interface (UPI) apps 2) Immediate payment service (IMPS) 3) Mobile Apps (BHIM) 4) Mobile wallets 5) Aadhar enabled payment service (AEPS) 6) Unstructured supplementary service data (USSD) **Traditional methods** 1) E – wallet **2) Cards** Debit Card Credit card 3) Net banking	• Easy and convenient • Pay or send money from **anywhere** • **Discounts** from taxes • Written record • Less Risk	• Difficult for a Non-technical person • The risk of data theft • Overspending

I. Virtualization

Virtualization means to **create a virtual version of a device or resource**, such as a server, storage device, network or even an operating system where the framework divides the resource into one or more execution environments.
This refers to technologies **designed to provide a layer of abstraction** between computer hardware systems and the software running on them.

Application Areas
- Server Consolidation
- Disaster Recovery
- Testing and Training
- Portable Applications
- Portable Workspaces

Types of Virtualization

Hardware Virtualization	Network Virtualization	Storage Virtualization
This refers to the creation of a virtual machine that acts like a real computer with an operating system. The basic idea of Hardware virtualization is to **consolidate many small physical servers into one large physical server so that the processor can be used more effectively.** For example, a computer that is running Microsoft Windows may host a virtual machine that looks like a computer with the Linux operating system; based software that can be run on the virtual machine.	It is a method of combining the available resources in a network by splitting up the available bandwidth into channels, each of which is independent from the others, and each of which can be assigned (or reassigned) to a particular server or device in real time. It is intended to optimize network speed, reliability flexibility, scalability, and security.	It is the apparent **pooling of data from multiple storage devices, even different types of storage devices, into what appears to be a single device** that is managed from a central console. It helps the storage administrator perform the tasks of **backup, archiving, and recovery more easily and in less time.**

II. Grid Computing:

It is a computer network in which **each computer's resources are shared with every other computer in the system.** It is a distributed architecture of large numbers of computers connected to solve a complex problem. In the grid computing model, servers or personal computers run independent tasks and are loosely linked by the Internet or low-speed networks.

Benefits	Types of Resources	Security
❖ Access to additional resources. ❖ Making use of Underutilized Resources. ❖ Resource Balancing. ❖ Parallel CPU Capacity ❖ Reliability. ❖ Virtual resources and virtual organizations for collaboration. ❖ Management.	❖ Computation (CPU) ❖ Storage (HDD) ❖ Communications (Network) ❖ Software and Licenses ❖ Special equipment, capacities, architectures, and policies (Other Hardware, Operating system)	❖ Single Sign-on. ❖ Protection of Credentials. ❖ Support for secure group communication. ❖ Support for multiple implementations ❖ Interoperability with local security solutions.

III. Cloud Computing:

Cloud Computing is both, a combination of software and hardware based computing resources delivered as a networked service. This model of IT enabled services enables anytime access to a shared pool of applications and resources. These applications and resources can be accessed using a simple front-end interface such as a Web browser, and thus enabling users to access the resources from any client device including notebooks, desktops and mobile devices.

Characteristics
- ❖ Elasticity & Scalability
- ❖ Pay-Per-Use
- ❖ On-demand
- ❖ Resiliency
- ❖ Multi-Tenancy / Sharing

Advantages
- ❖ Pervasive accessibility
- ❖ Globalize the workforce
- ❖ Reduce capital costs
- ❖ Minimize maintenance & licensing software
- ❖ Improved flexibility
- ❖ Achieve economies of scale
- ❖ Reduce spending on technology infrastructure
- ❖ Streamline business processes
- ❖ Monitor projects more effectively

Emerging Technologies

Types of Cloud			
Private Cloud	**Public Cloud**	**Community Cloud**	**Hybrid Cloud**
It resides within the boundaries of an organization and is **used exclusively for the organization's benefits**. Private Clouds can either be private to the organization and managed by the single organization **(On-Premise Private Cloud)** or can be managed by third party **(Outsourced Private Cloud).**	It is the cloud infrastructure that is provisioned for open **use by the general public**. It may be owned, managed, and operated by a business, academic, or government organizations, or some combination of them. Typically, public clouds are Internet, and the services are offered on pay-per-use basis.	It is the cloud infrastructure that is provisioned for **exclusive use by a specific community of consumers** from organizations that have shared concerns.	This is a **combination of both, atleast one private (internal) and atleast one public (external) cloud computing environments**- usually, consisting of infrastructure, platforms and applications. The usual method of using the hybrid cloud is **to have a private cloud initially, and Then for additional resources, the public cloud is used.**
Characteristics of Cloud Computing			
❖ Secure ❖ Central Control ❖ Weak Service Level ❖ Agreements (SLAs)	❖ Highly Scalable ❖ Affordable ❖ Less Secure ❖ Highly available ❖ Stringent SLAs	❖ Collaborative & Distributive maintenance ❖ Partially secure ❖ Cost effective	❖ Scalable ❖ Partially Secure ❖ Stringent SLAs ❖ Complex Cloud Management

Cloud Computing Service Models		
Infrastructure as a Service (IaaS)	**Platform as a Service (PaaS)**	**Software as a service (SaaS)**
IaaS, a **hardware-level service**, **provides computing resources** such as processing power, memory, storage, and networks for cloud users to run their application on-demand.	PaaS provides the users the **ability to develop** and deploy **an application** on the development platform provided by theservice provider.	SaaS provides ability to the end users to **access an application over the Internet that is hosted and managed by the service provider.**
This allows users to maximize the utilization of computing capacities without having to own and manage their own resources.	PaaS **changes** the application **development from local machine to online.**	SaaS is delivered as an on-demand service over the Internet; there is noneed to install the software to the end-user's devices.
Different instances are - Network as a Service(NaaS), Storage as a Service (STaaS), Database as a Service (DBaaS)	**PaaS providers may provide operating system, programming languages, software development tools, database.**	Different instances of SaaS includeTesting as a Service (TaaS), API as a Service (APIaaS), Email as a Service (EaaS)

Other cloud computing Service Models:

- Communication as a Service(CaaS),
- Data as a Service (DaaS),
- Security as a Service (SECaaS), and
- Identity as a Service (IDaaS).

IV. Mobile Computing: This refers to technology that allows transmission of data via a computer without having to be connected to a fixed physical link.

Components	Limitations	Benefits
❖ **Mobile Communication:** Refers to **Infrastructure** put in place to ensure that seamless and reliable communication goes on. ❖ **Mobile Hardware**: This includes **mobile devices**/device components that range from Portable laptops, Smart Phones, Tablet PCs, and Personal Digital Assistants (PDA). ❖ **Mobile Software:** it is the actual programme that runs on the mobile hardware and deals with the characteristics and requirements of mobile applications.	❖ Insufficient Bandwidth ❖ Power consumption ❖ Transmission interferences ❖ Potential health hazards ❖ Human interface with device ❖ Security	❖ Mobile workforce with **remote access to work order details**. ❖ Enables mobile sales personnel to **update work order** status in real-time. ❖ Facilitates **access to corporate** services and **information** at any time. ❖ Provides remote **access to the corporate knowledge** base at job location. ❖ Enables to **improve management effectiveness** by enhancing information quality, information flow, and ability to control a mobile workforce.

IV. Green Computing: Green Computing or Green IT refers to the study and practice of environmentally sustainable computing or IT. In other words, it is the study and practice of establishing / using computers and IT resources in a more efficient and environmentally friendly and responsible way.

Best Practices	❖ Develop a sustainable Green Computing plan ❖ Recycle ❖ Make environmentally sound purchase decisions ❖ Reduce Paper Consumption ❖ Conserve Energy

V. BYOD (Bring Your Own Device): This refers to **business policy** that allows employees to use their preferred computing devices, like smart phones and laptops for business purposes. It means employees are welcome to use personal devices (laptops, smart phones, tablets etc.) to connect to the corporate network to access information and application.

Advantages	Emerging BYOD Threats
❖ Happy Employees ❖ Increased employee efficiency ❖ Lower IT budgets ❖ Reduces IT support requirement ❖ Early adoption of new Technologies	❖ **Network Risks:** As BYOD permits employees to carry their own devices (smart phones, laptops for business use), the **IT practice team is unaware about the number of devices being connected** to the network. As network visibility is of high importance, this lack of visibility can be hazardous. ❖ **Device Risks:** It is normally exemplified and hidden in 'Loss of Devices'. A **lost or stolen device** can result in an enormous financial and reputational embarrassment to an organization as the device may hold sensitive corporate information. ❖ **Application Risks:** It is normally exemplified and hidden in 'Application Viruses and Malware'. Organizations are not clear in deciding that 'who is responsible for device security – the organization or the user'. ❖ **Implementation Risks:** It is normally exemplified and hidden in '**Weak BYOD Policy**'. The effective implementation of the BYOD program should not only cover technical issues mentioned above but also mandate the development of a **robust implementation policy**.

VI. Web 3.0 Technology

❖ Known as the Semantic Web, this describes sites **wherein the computers will generate raw data on their own without direct user interaction.**

❖ Web 3.0 standard uses semantic web technology, drag and drop mash-ups, widgets, user

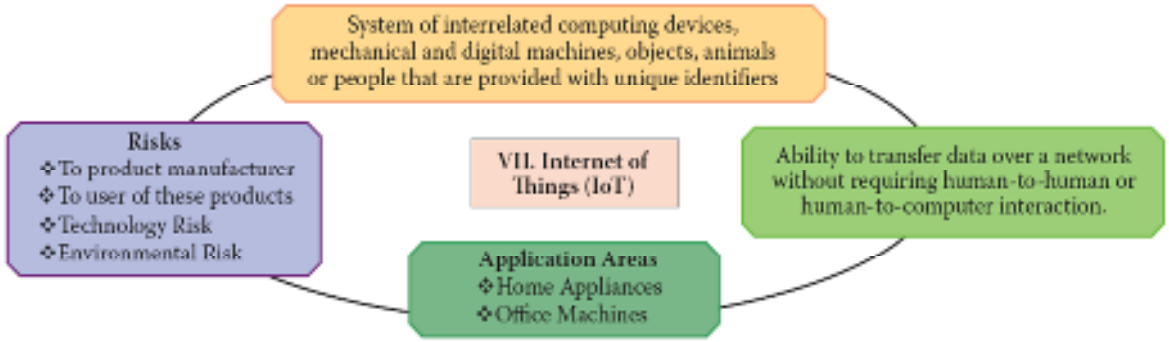
behaviour, user engagement, and consolidation of dynamic web contents depending on the interest of the individual users.

❖ Web 3.0 Technology **uses the "Data Web" Technology**, which features the data records that are publishable and reusable on the web through query-able formats.

Web 3.0 Components

Semantic Web	**Web Services**
This provides the web user a common framework that could be used to share and reuse the data across various applications, enterprises, and community boundaries.	It is a software system that supports computer - to - computer interaction over the Internet. For example – photo sharing website.

Internet of things (iot)



VIII. Artificial Intelligence may be defined as the ability to use memory, knowledge, experience, understanding, reasoning, imagination and judgement to solve problems and adapt to new situations. Applications Areas include Medical diagnosis; in cancer research; Predicting the chances of an individual getting ill by a disease; Creating art such as poetry; Proving mathematical theorems; Playing games (such as Chess or Go) and predicting the outcomes etc.

IX. Machine Learning is a type of Artificial Intelligence (AI) that **provides computers with the ability to learn without being explicitly programmed**. Machine learning focuses on the development of computer programs **that can change when exposed to new data.** The process of machine learning is similar to that of data mining. For example. Machine learning has been used for image, video, and text recognition, as well as serving as the power behind recommendation engines.