EIS CHAP -4

E-COMMERCE, M-COMMERCE AND EMERGING TECHNOLOGY

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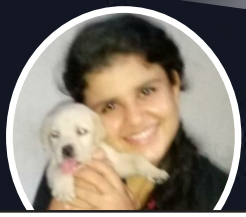

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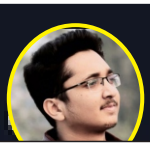

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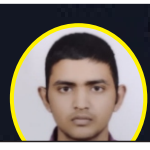

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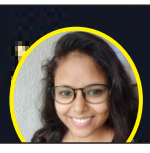

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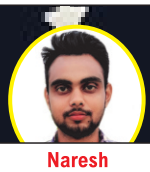

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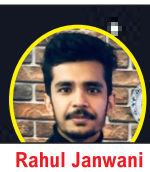

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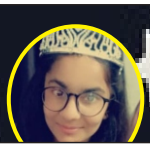

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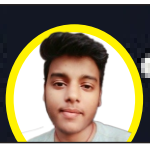

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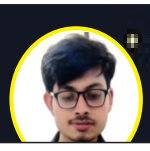

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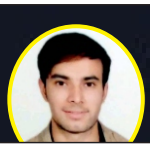

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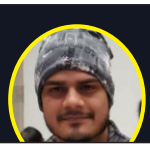

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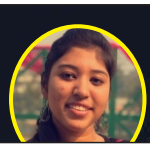

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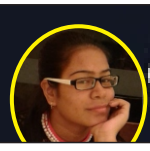

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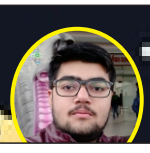

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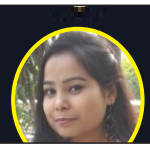

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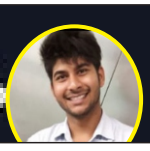

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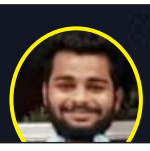

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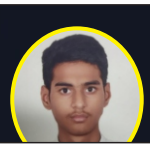

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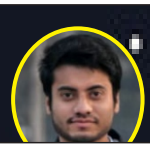

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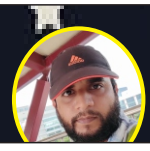

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CHAPTER 4

E-COMMERCE, M-COMMERCE & EMERGING TECHNOLOGY

1. E-COMMERCE

- Refers to doing Business (Buying, Selling & Other related functions like inventory mgt.) electronically.
- Means use of Technology (Internet, computer, Mobile, Apps, website etc.) to enhance processing of commercial transactions between company, customer & business partners like seller.
- Involves automation of variety of transactions such as B2B, B2C, C2C, C2B etc. through Reliable & Secure Technology.

2. DIFFERENCE BETWEEN TRADITIONAL COMMERCE & E-COMMERCE

Basis	Traditional Commerce	E- Commerce
Transaction Processing	Manual	Electronically
Customer Interaction	Face to face	Screen to face
Business scope	Limited to particular area	Worldwide reach
Availability for business	Limited Time	24x7x 365
Nature of purchase	Goods can be inspected physically before purchase	Goods cannot be inspected physically before purchase
Information Exchange	No uniform platform	Provides uniform platform
Fraud	Relatively less due to personal interaction b/w buyer and seller	More Risk due to Lack of physical presence & unclear legal issues
Resource Focus	Supply side	Demand side

Q. Differentiate Traditional Commerce and E- Commerce.

3. BENEFITS OF E-COMMERCE

Individual User	Seller	Government
a) Time Saving - Some products such as e-books, recharge of mobile can be delivered online through internet. b) Various Options- by diff. sellers which are easy to compare. c) Convenience – w.r.t. Searching, placing Order and Payment.	a) Reduction of Cost - of overhead (salary), Rent, marketing and advertisements [E-mail /Digital marketing] etc. b) Recurring Payments made easy. c) Instant Transaction - which are processed in real time, so no. of sales made increases. d) Increased Customer Base - since no. of people getting online is increasing. e) Creation of new markets: Done through the	a) Instrument to fight corruptions - as all transaction are recorded, No tax evasion. b) Reduction in use of ecologically damaging materials - through electronic

Individual User	Seller	Government
d) Anytime Access – [24X7X365] e) Easy to Find Reviews – User can give feedback & ratings which helps buyer to make better decision. f) Coupon and Deals	ability to reach potential customers easily and with low cost. f) Easier Entry into New Market – as reach of e-commerce is worldwide. g) Efficiency Improvement – Reduction in ➢ Time required to complete transactions; ➢ Errors in billing, invoicing & data entry ➢ Inventory holding cost due to JIT.	coordination of activities and the movement of information rather than physical objects.

Q. e-business benefits individuals, businesses, government and society at large. As a business seller, analyse the benefits that you would draw from e-business.

Q. To an individual/user, identify various benefits that he can draw from E-commerce transactions.

4. Disadvantages of E-Commerce

a) **Internet Connection**	Internet connectivity is a pre-requisite to perform online transactions. It may not be available in rural or remote areas.
b) **High start-up costs**	Various components of costs involved with e- commerce are due to following ▪ **Connection:** Connection costs to Internet. ▪ **Hardware/software:** Includes cost of sophisticated computers, routers etc. ▪ **Set up:** Includes employee work hours involved in setting up systems. ▪ **Maintenance:** Includes costs involved in training of employees & maintenance of web-pages.
c) **Legal issues**	The legal environment in which e-commerce is conducted is full of unclear & conflicting laws.
d) **Security Concerns**	There is risk of security and reliability of network and internet as well as fear of safety and security to the personal information due to the increased spywares and malwares
e) **Cultural impediments**	Some customers are still somewhat fearful of sending their credit card numbers over the Internet. Also, many customers are simply resistant to change.
f) **Some businesses may never lend themselves to e-commerce**	Items such as perishable foods and high-cost items such as jewellery and antiques may be impossible to adequately inspect from a remote location.

5. E-Marketing

- Refers to process of marketing a product or service using the Internet.
- The internet changes the relationship between buyers and sellers because market information is available to all parties involved in the transaction.
- Some of the relevant terms related to e-marketing are as follows:

I. **Portals**	It is a website that serves as a gateway on the internet to a specific field of interest or an industry.

	It is a channel through which websites are offered as content. Firms control the content or portal and earn revenue by charging customers for subscription or advertising. Website + login + motive is to earn money. Eg – www.mca.gov.in, Google, Netflix, Tax sutra, Taxmann.com
2. E-shop/ e-Tailor	It is a virtual store front that sells products and services online where customers can shop at any hour of the day or night without leaving home. It is convenient way of effecting direct sale to customers. No intermediaries are involved, hence cost & time delay is reduced. Eg- www.vanheusenindia.com
3. E- malls	It is collection of e-shops usually grouped under a single Internet address. It is e-retailing model of a shopping mall. It is Conglomeration of different e-shops situated in an e-commerce location. They are mainly of following types: a) **General stores/malls:** These are online stores that have a variety of items for sale and do not specialize in selling any one item and are thus called General stores. It includes store like amazon.com which is primarily an e-mall that provides platform to vendors sell and users to purchase various products ranging from books, music, movies, housewares, electronics, toys, clothes etc. b) **Specialized stores/malls:** The specialized stores would sell only specialized items. For example - www.99acres.com is a website that specializes in buying and selling property and housing on an online platform.
4. E- Auction	It provides channel of communication (auction websites) though which bidding process for products & services can take place between completing buyers. Eg – www.bidderboy.com
5. Buyer Aggregator	They bring together large no. of buyers so that they can enjoy savings which are generally enjoyed by large volume buyers. Firms collects info about Goods/Services, make services providers their partners & sell under its own brand. Eg- www.zomato.com, Ola, Uber
6. Virtual Community	Community of customers who share common Interest & use internet to communicate with each other. It helps participants as they get greater benefits like solving queries, sharing ideas etc., without additional cost. E.g.- Microsoft community, Facebook Community
7. E- distribution	e-distribution is a concept where a Co. supplies products & services directly to individual businesses. It helps distributors in achieving efficiency by managing large volume of customers, automating orders, communicating with partners and providing value added services like order tracking. An example of a firm specializing in e-distribution is www.wipro.com that uses internet to provide fully integrated e-business enabled solutions that help to unify the information flows across all the major distribution processes.
8. E-Procurement	Refers to Management of all procurement activities though electronic means. Many companies now prefer to procure the required goods and services through a website devoted to procurement. E- procurement infomediaries provide upto date & real time information w.r.t. supply of

	material to business partners. Leads to efficiency in accessing info & saving of time & cost. E.g. www.e-procure.gov.in

6. E-Commerce Business Models

- B.M. refers to the mechanism by which a business intends to generate revenue and profits and includes products, services and information flows, the sources of revenues, and benefits for suppliers and customers.
- A business model enables a firm to
  - analyze its environment more effectively and
  - exploit the potential of its markets;
  - better understand its customers; and
  - raise entry barriers for rivals.
- An e-business model is the adaptation of an organization's business model to internet economy.
- E-business models utilize the benefits of electronic communications to achieve the value additions.
- The e-business models relating to e-business markets can be summarized as given below:

Business to Consumers [B2C]	Business to Business [B2B]	Consumer to Consumer [C2C]	Consumer to Business [C2B]	Government to Consumer [G2C]	Business to Government [B2G]
Refers to online retailers who sell products & services through internet. Supports activities within consumer chain. Focuses on sell side activities. Types a) Direct sellers - E.g. vanheusenindia.com b) Online Intermediary- E.g. Amazon.com c) Community built around shared interest like cooking, photography etc. E.g. www.cookingmatters.com	Refers to commerce b/w company, its suppliers or other participants. Supports supply chain of Org. E.g. www.Indiamart.com	Consumers sell directly to other consumers through online classified Ads, auctions or personal selling. Matches Revenue stream of buyers with sellers & vice -versa. E.g. OLX.in	Consumers create value & businesses consume that value. In this model, a reverse auction allows consumers to set and demand their own price and companies bid to provide product & service. E.g.- job portals like TimesJobs.com Comparison of interest rates of loans by various banks to customers like www.paisa Bazar.com	Allows consumers to provide feedback & ask info. like land search, license confirmation, vehicle ownership etc. from Govt. authorities. Government provides the information / services asked for. E.g. e-Seva (Andhra Pradesh)	Variant of B2B model. Govt. accredits selected websites. These websites act as a medium of exchanging information Businesses use these websites to ➢ File Reports ➢ Pay taxes ➢ Sell Goods & services to Govt
e-shops, e malls, e-auctions, Buyer	e-auctions, e-	e-auctions	e-distribution	Portal	Portal

aggregators	procurement, e-distribution				

Q. A business model is the mechanism by which a business intends to generate revenue and profits. Explain the different e-commerce business models.

Q. A business model is adopted by an organization as a framework to describe how it makes money on a sustainable basis & grows whereas an e-business model utilizes the benefits of electronic communications. Discuss various e-market models that help businesses to achieve the value adding processes.

7. COMPONENTS OF E-COMMERCE

User	E-Commerce Vendors	Technology Infrastructure	Internet/ Network	Web Portal	Payment Gateway
Any individual / organization or anybody using e-commerce platforms. E-comm vendors need to ensure that user's loyalty is built through timely delivery, easy redressal, customer-friendly return policy, and complete customer satisfaction.	Refers to Org/ Entity providing the G/s user asked for. E.g. Flipkart. They need to ensure following for effective & efficient Transactions: a) **E-commerce catalogues and product display** – all info should be displayed properly. b) **Suppliers & SCM** – Should have enough right suppliers who are financially & operation-ally stable. Should provide real-time stock inventory & short delivery time. c) **W/H operations** – Where Goods are stored & packed as per pre-determined standard. d) **Shipping & Returns** – Supplementary & complementary to w/h operation. Fast return is USP of vendors. e) **Showroom and offline purchase** – Many vendors have opened outlets for customer experience of their products. f) **Marketing & loyalty program** – To establish long-term relationship with customer.	E-commerce is technology driven. To be successful, web site should be: a) Scalable with minimal effort to handle peak traffic b) Easy to use and convenient c) Implementing Responsive Design to make website accessible & usable on every device. Following tech. enable e-commerce: a) **Computer server & DB** – Backbone of e-commerce. E-Comm Vendors invest huge amount in such infra. b) **Mobile App** – Smaller version of computer s/w programmed to run on mobile/ tablet. Expensive & runs on 1 type of OS. c) **Digital Library** – Special library focussed on collection of digital objects (text, audio, video) stored in e-media format. Type of info. retrieval	It is Key to success of e- comm. Transaction & Critical Enabler. Faster internet results in better e-commerce.	Provides interface/ front end through which user interacts with e-commerce vendor. Can be accessed through laptop, desktop, mobile & hand-held device. Simplicity and clarity of content on web portal is directly linked to customer experience of buying a product online.	It is integrated with E-Commerce website. System of computer processes that authorizes, verifies, and accepts or declines payment on behalf of merchant through secure Internet connections. Last & most crucial part of e- comm transactions. Assures seller of receipt of payment. Various modes are ▪ Debit card ▪ Credit Card ▪ UPI ▪ COD

User	E-Commerce Vendors	Technology Infrastructure	Internet/ Network	Web Portal	Payment Gateway
	g) **Privacy policy** – Explains usage of customer's data in as per IT Act 2000. h) **Security policy** – So that data is safe through tech like SSL.	system. d) **Data Interchange** – Electronic communication of data b/w different parties. There are defined standards to ensure seamless comm.			

Q. DEF is a car battery manufacturing company which intends to provide online business to its customers. Briefly explain various components involved in any e-Commerce transaction.
Q. Write short note on digital library, web portal and payment gateway.

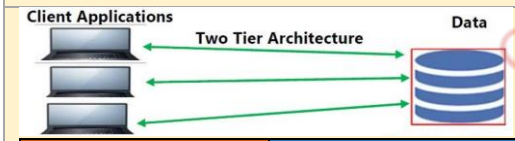
8. Architecture of Networked System

Architecture refers to style of designing/ method of construction.

In e-Business, it denotes the way network architectures are built. E-Commerce runs through network connected system which can be of two types

Two Tier Architecture

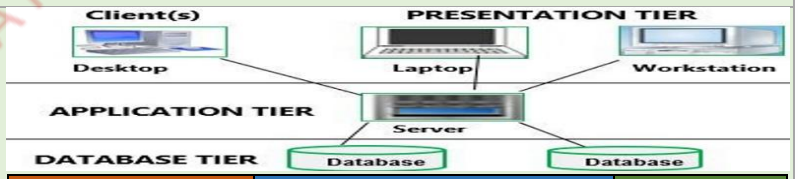
In this, client (user) sends request to Server and the Server responds to the request by fetching the data from it.



Presentation Tier/ Client Tier/ Client App Tier	Database Tier
Refers to interface that allows user to interact with e-commerce vendor. User can login to e-commerce through this tier & all information is displayed to him.	Data like Product data, Price data, customer data & other data is kept here. All information is stored & retrieved from this tier. User has no access to data at this level but can access it through Client Tier.

Three Tier Architecture

Well-established client-server architecture where the business logic, computer data storage and user interface are developed and maintained as independent modules on separate platforms.



Presentation Tier /Client Tier	Application/ Logic/ Business/Middle Tier	Database Tier
Top level & displays info. related to goods and services on website. For login & checking the products, App tier is used.	Controls App functionality by performing detailed processing. Part of the program that encodes the real-world business rules that determine how data can be created, displayed, stored and changed.	Same as Two tier

All e-commerce & M-commerce applications follow three-tier network architecture.

Q. Discuss the architecture of Networked Systems.

Q. E-commerce runs through different network-connected systems that can have two types of architecture namely Two-Tier Architecture and Three – Tier Architecture. Determine the differences.

8.1. Advantages & Limitations of Two- Tier Architecture

Advantages	Disadvantages / Limitations
a) Easy to setup & maintain due to simple structure. b) System performance is higher since business logic & database are physically close. c) Processing is shared b/w client & database. Hence more users can interact with system.	a) Performance declines if number of users increase. b) Restricted flexibility as any change in version of s/w needs to be installed in each user's device. c) Lesser choice of DBMS.

8.2. Advantages & Limitations of Three Tier Architecture

Advantages	Disadvantages / Limitations
a) Change Mgt. (updating version of s/w) - Any component change can be done on App server rather than user's device in easy & faster way. b) Clear Separation of user interface control & data presentation from application logic - results in quicker development of s/w. c) Dynamic load balancing - if some bottleneck in performance occurs, the server process can be shifted to another server in real time. d) Other Benefits - Higher performance, Flexibility in deployment of Architecture due to modular s/w, Scalability, Improved security & data integrity.	a) Increased need of network traffic management, load balancing & fault tolerance. b) Current tools are relatively immature & complex. c) Maintenance tools are inadequate for maintaining server.

9. M- Commerce

- Refers to Buying & Selling of Goods & services and related activities though wireless hand-held devices like mobile phones and Personal Digital Assistants (PDAs) like tablet etc.
- M-commerce enables users to access the Internet without needing to find a place to plug in.
- Growth in m-Commerce has been through App. It can be downloaded by user or pre-installed.

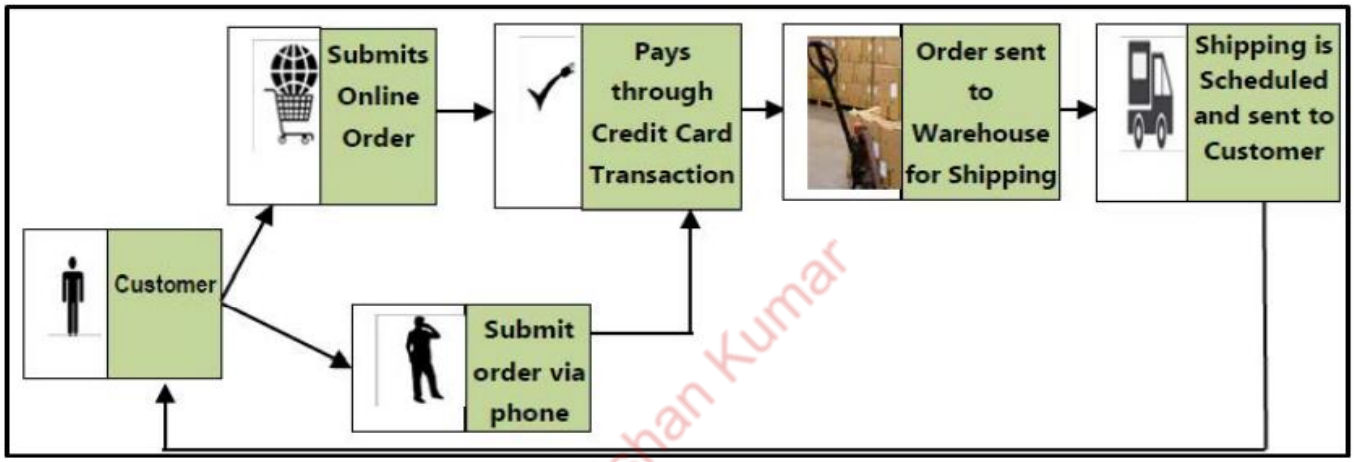
E-Commerce Architecture Vide Internet & Mobile Apps

Layer/ Tier	E-commerce vide Internet	E-Commerce vide Mobile Apps
Client/ Presentation Tier (user interface)	Web server, web browser & Internet Helps the e-commerce customer to connect to e-commerce merchant.	Mobile web browser, Mobile App, Internet Helps the e-commerce customer to connect to e-commerce merchant.
Application Tier	App server & Back-end server. (includes seller, logistics partner, Payment gateway) It allows customer to check the	Same

Layer/ Tier	E-commerce vide Internet	E-Commerce vide Mobile Apps
	products available on merchant's website.	
Database Tier	DB server i.e., Info store house where all data is stored.	Same

Q. ABC Company is a supplier of kids' garment successfully running its business offline as well as online. Now, the company decides to launch its mobile app also so that its retail customers would be able to purchase or place orders anytime and anywhere. Describe the method through which ABC Company will run its e-Commerce architecture on Mobile app.

10. Work Flow of E-Commerce



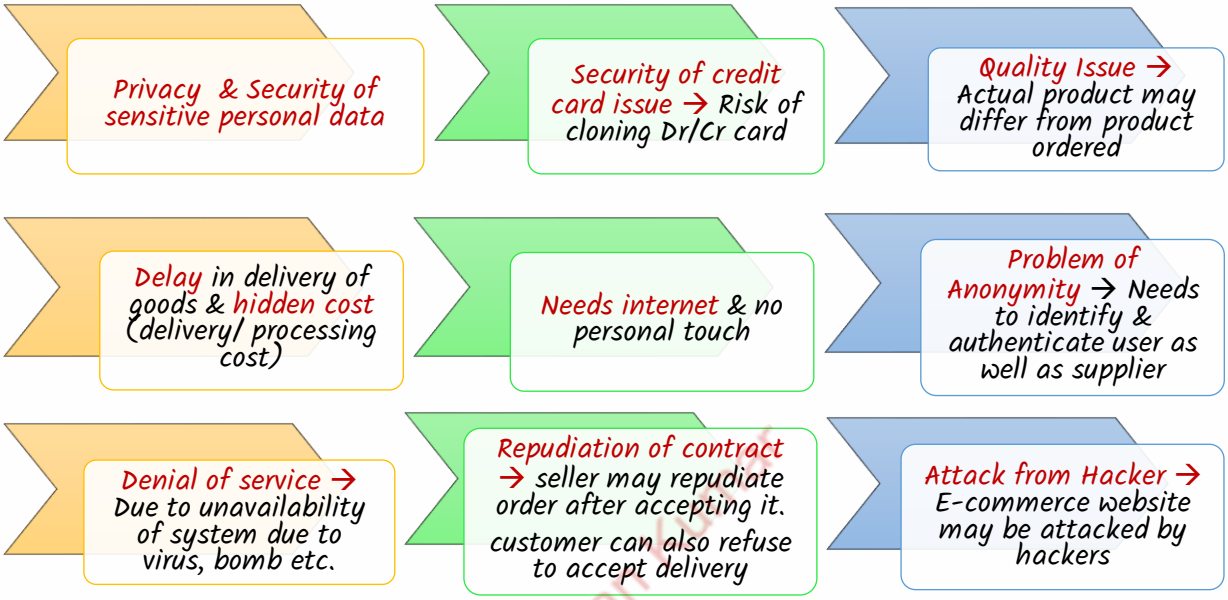
1. Customers Login	Customer log-in on e-commerce website or mobile App.
2. Product / Service	Customer selects products / services from available options.
3. Customer Places Order	Order is placed for selected product / service by customer.
4. Payment Gateway	Customer selects the payment method. In case payment methods is other than Cash on Delivery (COD), the merchant gets the update from payment gateway about payment realization from customer.
5. Dispatch and Shipping Process	This process may be executed at two different ends. First if product / service inventory is managed by e-commerce vendor, then dispatch shall be initiated at vendor's warehouse. Second, many e-commerce merchants allow third party vendors to sale through merchant websites.
6. Delivery Tracking	All merchants have provided their delivery staff with hand held devices, where the product / service delivery to customers is immediately updated.
7. COD Tracking	In case products are sold on COD payment mode, merchants need to have additional check on matching delivery with payments.
Note: Numerous services are of the nature which does not have a separate delivery need, for example booking a train ticket through www.irctc.co.in. In this case, there is no separate delivery of service.	

Q. Ms. Neha is the owner of a consultant company named JKL Ltd. On Diwali, she decided to offer Brass bottle as Diwali gift to each staff member. She placed an order of 20 bottles from online portal. Explain the different steps involved in this e-commerce transaction in buying the bottles online. [MTP Dec 21]

Q. A customer X intends to place an order for an electric cooker on an online portal ABC.com. With the help of the diagram, determine the general workflow of the E- Commerce transaction that will take place.

11. Risks & Controls in E- Commerce

11.1. Risks i.e Possibility of Loss in case of e-commerce are high compared to general internet activities.



Q. Discuss various risks associated with E-Commerce transactions that are high as compared to general Internet activities?

Q. Jot down all the risks associated with e-Business Environment.

Q. DJY is a brand in the field of online supplier of kids' apparels. As we know that risks associated with e-commerce transactions are high as compared to general internet activities, what do you think are the risks that DJY is addressing due to its online transactions.

11.2. Controls in e-Business Environment → Necessary for each Participant in the Chain

1. Users	▪ To ensure that genuine users are on e- commerce website. This prevents attack on website from Hackers.
2. Sellers/ Merchants	▪ Should be financially & operationally stable. Control is needed for ➢ Product catalogues ➢ Price catalogues ➢ Discount and promotional schemes ➢ Shipping & return ➢ Accounting for cash received through Cash on Delivery mode of sales.
3. Government	▪ Two major concerns - Tax accounting of G/Sr sold & only legal G/Sr are sold.
4. Network Service Provider	▪ To ensure availability & security of network. Any downtime can be disastrous.
5. Technology	▪ Includes all service other network service. E.g. cloud computing, App Backends etc.

Service Provider	▪ To ensure availability & security of technology.
6. Logistics service provider	▪ Responsible for timely delivery of product as ordered. ▪ Success or failure of any e-commerce / m- commerce venture finally lies here.
7. Payment Gateway	▪ To ensure effective & efficient processing of payment.

11.3. CONTROLS FOR MITIGATING RISK

Educate participants about nature of risk	Communication of organizational policy to Customers	Ensure compliance with Industry Body standard	Protect your e-commerce website from Intrusion
Policy may include a) Frequency and nature of educational programmes. b) Participants for such programme **Example** "Dos and Don'ts" for online payments advertised by Banks.	a) Privacy policy i.e., How data will be used b) Information Security policy c) Shipping & Billing policy d) Refund policy This avoids customer dissatisfaction and disputes	RBI releases these standards from time to time which must be complied.	a) Hackers - Use security software package to protect website. b) Virus- Scan website daily for viruses. c) Password - Ensure employees use strong password & change it periodically. Also access of ex-employees must be terminated. d) Regular s/w update - Website should have newest version of security s/w. e) Sensitive data - Encryption of financial & other confidential data.

Q. What are the ways of protecting your e-Commerce business from intrusion?

12. GUIDELINES & LAWS GOVERNING E- COMMERCE

12.1. GUIDELINES GOVERNING E- COMMERCE (DECIDED BY E- COMMERCE)

All e-commerce vendors need to create clear policy guidelines for the following & communicate it to users.

Billing	Shipping	Delivery	Payment	Return	Product Guarantee/Warranty
Format of Bill Details in Bill Applicable GST	Shipping Date & Time, Expected date of dispatch & delivery	Mode of delivery? - Courier - Hand delivery When will goods be delivered? - Time & date Where delivery is to be made? - Home	Mode - COD - online payment Specific payment mode for specific product must be highlighted.	Which goods can be returned? Within how many days? Process of verifying authenticity Duration after which money will be refunded.	Proper display guarantee/warranty on website Also send G/w document along with product.

		- Office			

12.2. COMMERCIAL LAWS GOVERNING E-COMMERCE

All e-commerce transactions are essentially commercial transactions. Hence following laws are applicable:	
1. Income Tax Act 1961	▪ Act to levy & collect Income Tax on Income. ▪ concerned with deciding place of origin of Transaction for tax purpose.
2. GST Act, 2017	▪ Covers all aspect of E- commerce ▪ Each supplier is required to upload details of outward supply on common portal.
3. Companies Act, 2013	▪ Regulate companies. All major e-commerce organizations are companies.
4. Factories Act, 1948	▪ Regulates working condition of workers. Extend to place of storage as well as transportation.
5. Customs Act, 1962	▪ Deals in Import/ Export of goods. India is signatory to GATT of WTO & can't levy custom duty that are not WTO compliant.
6. Consumer Protection Act, 1986	▪ Act to safeguard interest of consumers. It is source of most of litigation.
7. Foreign Exchange Management Act, 1999	▪ Regulates FDI & flow of foreign exchange in India. ▪ FDI upto 100% allowed in e- commerce dealing in B2B e- commerce. ▪ Foreign investment in B2C e- commerce activities has been opened in a calibrated manner and an entity is permitted to undertake retail trading through e-commerce under the following circumstances: a) A manufacturer is permitted to sell its products manufactured in India through e-commerce retail. b) A single brand retail trading entity operating through brick-and-mortar stores is permitted to undertake retail trading through e-commerce. c) An Indian manufacturer is permitted to sell its own single brand products through e-commerce retail. Indian manufacturer would be the investee company, which is the owner of the Indian brand, and which manufactures in India, in terms of value, at least 70% of its products in house, and sources, at most 30% from Indian manufacturers.
8. Competition Act, 2002	▪ Regulates practices that have appreciable adverse effect on competition through competition commission. ▪ checks predatory pricing by E-Commerce vendors.
9. Indian Contact Act	▪ Defines constituents of valid contract.

Q. With promotion of cashless economy, most of the businesses are using e-commerce and m-commerce transactions. Enlist the commercial laws that are applicable to these transactions.

12.3. SPECIAL LAWS GOVERNING E- COMMERCE

Information Technology Act, 2000	RBI Act, 1934
▪ Govern all internet activities in India including all	RBI frames guidelines to be followed by E-

Information Technology Act, 2000	RBI Act, 1934
online transaction in India. ▪ Provides legal sanctity to online transactions, online contracts & provides for penalty for non-compliance. ▪ Refer Chapter 1 & 5 for detailed discussion.	Commerce & M- Commerce. E.g. Conversion of Dr/Cr card into chip-based card. OTP/PIN must for online payments or payments at PoS. The compliance with capital adequacy norms for payments wallet like SBI BUDDY/PAYTM etc.

13. Forces Behind E-Commerce Revolution / Trends in E-Commerce

E-commerce business is expected to grow at a rapid pace. Businesses which have the vision to anticipate change and catch the trend before the competitors do would definitely be more successful.

E- marketers need to develop not only their product quality but also user experience to retain customers.

1. **Proliferation of Mobile Device**	User is moving from desktop to mobile computing. 55% online traffic is generated on mobile & its increasing. Creation of mobile apps for e-commerce website & mobile marketing is latest trend. Latest trend is to use video for content marketing to attract customers. Shoppable videos instead of images enables customer to shop directly from videos.
2. **Convergence of Mobile Telecommunication Network and the Internet:**	Mobile internet is also about a very different user experience and is characterized by goal-oriented activities like reserving movie tickets or looking for directions. Transition from 3G to 5G and faster data rate along with many new applications and services makes the success of e-commerce possible.
3. **Social Network**	Social media is integral part of a customer's online habit. Latest trend is to include e-commerce in social networks, such as Facebook, Twitter, YouTube, etc. This allows the consumer to buy the product without even leaving the social media platform.
4. **Biometrics**	Since e- commerce involves serious security threats such as hacking, spamming, online fraud, theft of confidential data etc., Biometric verification is a means to solve security issues using physical characteristics of users such as fingerprint, face or voice.
5. **Artificial Intelligence**	AI in e-commerce offers personalized and interactive buying experiences. Use of AI like fully automated chat bot is another latest trend. Chatbot is first point of contract & answers all Q of consumers. Also known as messenger bots. Live chat users tend to spend more & buyer conversion rate is higher.
6. **Predictive Analysis**	P.A. helps in analysing customer's behaviour such as if customer does not return within 30days, he is lost. It helps to a) predict customers buying habits as per their taste & preference, both Q&Q & b) segmenting customers in different categories & improve conversions by offering ▪ Right customers

	▪ the right product ▪ in the right way ▪ at the Right time
7. Support of IT governing Laws	Various provisions of IT Act, 2000 and laws now govern E-commerce and empower the e-businesses and lower the chances of any upsetting legal conflicts or lost business.

14. DIGITAL PAYMENT

- It is way of payment which is made through digital modes.
- Also known as electronic payment as No cash is involved & Transaction is completed online.
- New digital payment platforms such as UPI and IMPS are becoming increasingly popular and have contributed to rapid growth of banks as well as E-Commerce.

Advantages	Disadvantages / Drawbacks / Limitations
a) Easy & Convenient b) Accessible from anywhere c) Less Risk if used wisely d) Written record of transaction e) Discount from taxes f) Competitive advantage to business g) Environment Friendly	a) Overspending b) Risk of data theft server of digital payment service provider can be hacked. c) Difficult for non-technical person d) Disputed transactions: In case of misused of electric money by someone else, it is very difficult to receive a refund. e) The necessity of internet access f) Increased business costs: additional costs in procuring, installing and maintaining sophisticated payment-security technologies.

Q. Digital Payment is a mechanism that has evolved with e-commerce transactions and are becoming increasingly popular. Its advantageous for banks to implement digital payments, however the same has few drawbacks also. Support the statement by identifying advantages & drawbacks of digital payments.

14.1. TYPES DIGITAL PAYMENT

- Traditional Methods
- New Methods

14.1.1. TRADITIONAL METHODS

Cards			Internet Banking
Debit Card	Credit Card	Smart Card	
Small plastic card containing unique no. linked with bank A/c number Issued by a bank & allows the holder to make payment directly from his	Small plastic card issued by a bank/ issuer, allowing the holder to purchase goods or services on credit. Buyer's cash flow is not instantly impacted as user	Prepaid card similar to credit card and debit card in appearance, but has a small microprocessor chip in it to store customer's personal info. such as financial facts, encryption keys, account information & so on. These are not linked to any bank account & user is not mandated to	Customers login to his/ her bank account and makes payments. All public sector banks & large private sector banks allow this facility to their

Bank A/c. Buyer's cash is instantly affected i.e. as soon as payment is approved, buyers account is debited.	makes payment to card issuer at end of billing cycle.	have a bank account. It is used to store money which is reduced as per usage. E.g. Mondex and Visa Cash cards.	customers.

14.1.2. NEW METHODS

UPI	IMPS	Mobile Apps	Mobile Wallet	AEPS	USSD
Unified payment interface. It is payment mode to make instant fund transfer from sender's bank account to the receiver's bank account through the mobile App. **Steps** ▪ User downloads UPI APP such as PhonePe, Google Pay, BHIM ▪ Create VPA/ UPI ID ▪ Register for Mobile Banking ▪ Link Bank A/c with UPI ID & Transfer Fund. UPI can be used 24 hours and even on public holidays.	Immediate Payment System Facilitates Instant inter-bank electronic fund transfer through Mobile, ATM & Net banking.	BHIM/Bharat Interface for money Developed by NPCI (National Payment Corp. of India) Based on UPI & built on IMPS infra. Allows user to send or receive money to/ from other UPI address by a) scanning QR code; or b) using A/c number with Indian Financial Systems Code (IFSC) code or c) MMID (Mobile Money Identifier) Code for users who don't have a UPI-based bank A/c	Mobile wallet or e-wallet is digital version of a physical or real-life wallet. Users can keep his/her money in E-wallet & use it when needed It stores bank account or Dr/Cr card info on mobile device. Used to make payment to merchants listed with mobile wallet service provider. E.g. PAYTM Mobikwik Freecharge Buddy	Aadhar Enabled Payment System is a Aadhaar based digital payment mode. AEPS allows bank to bank transactions i.e. money will be deducted from sender's A/c and credited to the payee's A/c directly. Customers need to link Aadhar with Bank A/c Can be used for financial as well as non – financial operations	Unstructured Supplementary Service Data Banking or *99# banking is mobile Banking based on Digital payment that works on basic phone through SMS. No need of smartphone or Internet Can be used for financial as well as non – financial operations like checking bank balance, generating MPIN etc.

Crypto Currency	▪ It is a digital currency (no physical form) produced by public network rather than any Government or bank. It is completely decentralized i.e, no controlling authority. ▪ It is a medium of exchange. Strong cryptography is used to ensure that payments are sent & received safely. ▪ Records of individual coin ownership is stored in computerized database using

	strong cryptography. ▪ Strong cryptography makes it nearly impossible to counterfeit & doubled spend ▪ E.g. – Bitcoin, Litecoin, Ethereum ▪ Advantages: Less transaction processing, fast transfer b/w sender & receiver, no risk of hacking or counterfeit currency.
e-Rupi	▪ e-Rupi is new mode of cashless and contactless digital payment launched by Government of India based on UPI systems to ensure seamless transfer of benefits to the citizens in a "leak-proof" manner. ▪ It is an e-voucher, which will be delivered to beneficiaries in the form of a QR code and SMS-string-based voucher. ▪ These vouchers are person-and purpose-specific, meaning if they are released by the government for the purpose of vaccination, for instance, then they can be redeemed only for that. ▪ This contactless e-RUPI is easy, safe and secure as it keeps the details of the beneficiaries completely confidential. ▪ The entire transaction process through this voucher is relatively faster and at the same time reliable, as the required amount is already stored in the voucher. ▪ Any government agency and corporation can generate e-RUPI vouchers via their partner banks.

Q. Subsequent to demonetization, one of your elderly neighbour, who was using traditional digital methods of making payments like cards, net banking etc., asked for your help to know about the various new methods of Digital Payments. Identify and explain various new methods of Digital Payments for him.

Q. During the pandemic Covid 19, the Government of India emphasized on the usage of various digital mode of payments by the public at large. In light of this statement, explain various types of cards that are provided to the account holders by the banks or companies to be used as digital payment mode.

PART II – EMERGING TECHNOLOGIES

15. VIRTUALISATION

- Refers to creation of virtual version of a device or resource such as server, network or storage device etc.
- It provides a layer of abstraction between hardware and software working on them.
- **Core Concept** – Partitioning which divides one physical hardware into multiple logical server/ virtual machines and each logical server can run an OS independently.
- **Example** - Partitioning of a hard drive is considered virtualization because one drive is partitioned in a way to create two separate hard drives.
- Helps in cutting IT expenses, enhancing security, and increasing operational efficiency.

15.1. APPLICATION AREAS OF VIRTUALISATION

Server consolidation	Disaster Recovery	Testing and training	Portable App	Portable workspace
It consolidates many servers into fewer servers. Known as physical to virtual transformation. Each physical server is known as virtual machine host & virtual machines appear as real.	Can be used as hot standby and in case any virtual machine is down, its work can be handled by other virtual machines, thus helping in disaster recovery.	Useful for kernel development of OS & OS courses for training and testing.	It enables to have portable Apps where Apps can be executed from removable device (PD/HD) directly without installing it into system main disk.	It helps to create portable workspaces/ OS that can be carried on devices like memory stick, USB, iPad.

Q. Discuss the concept of Virtualization and its various application areas.

15.2. Types of Virtualisation

Hardware Virtualization	Network Virtualization	Storage Virtualization
▪ Known as platform virtualisation ▪ Involves creation of virtual machines that acts like real computer with OS. ▪ S/w on these virtual machines is separate from underlying H/W ▪ Basic idea of virtualization is consolidation of server where multiple servers are consolidated to create virtual server ▪ Two softwares: Hypervisor and virtual machine manager.	▪ It is a method of combining available resources by splitting bandwidth/network into multiple channels. ▪ Each channel is independent & can be assigned/reassigned to any server. ▪ It allows a large physical network into multiple logical networks and vice- versa. ▪ Intended to optimize speed, scalability, flexibility etc.	▪ Refers to pooling of data form multiple storage devices into what appears to be a single device that is managed centrally. ▪ Helps to perform job of back up, achieving (old & unused data), recovery easily by disguising the complexity of storage access network [SAN].

Q. Recognize the differences between Hardware Virtualization and Network Virtualization.

16. Grid Computing

- It is a computer network in which each computer's resource (processor, storage, Network etc.) is shared with other computer in a system/network.
- It is a distributed architecture of large number of computers connected to solve complex problems. E.g.: Data mining.
- In the grid computing model, servers or personal computers run independent tasks and are loosely linked by the Internet or low speed networks.

- It turns a computer network into a powerful super-computer.

16.1. Benefits of Grid Computing

1. Access to additional resources	like computational power, Network, storage etc.
2. Making use of under-utilized resource	It provides a framework to use/ exploit unutilized IT resources in an Org.
3. Resource Balancing	It enables RB in which if a computer's load peaks, it can transfer its work to another computer with less utilization.
4. Parallel CPU capacity	It helps in scalability & faster performance
5. Reliability	Since high –end computing systems are used, grid computing is reliable. Further due to multiple resources, if one computer fails, work will continue as its work will be transferred to another computer in network.
6. Management	It helps in better management of large No. of computer systems. It also manages priorities among different projects.

Q. SCI Labs is an organization involved in research and development of new medicines and drugs. The company has five branches in different cities across the country interconnected using Grid Computing model so as to share the resources and research that are carried out in its different branches. Explain the benefits that SCI Labs may incur while using Grid Computing.

16.2. Types of Resources in Grid

Computation Power (CPU)	Storage	Communications	Software and License	Special Equipment capacities, architecture and policies
It's the most common resource shared in G.C. Processors offered by members of Grid may differ in architecture, memory etc. but can still be shared. Three ways to exploit this resource in G.C.: a) To run an App on computer in grid rather than locally. b) To run an App that needs to be executed multiple times on diff. computers in a Grid. c) To split the work in separate parts so that it can be executed in parallel	▪ A grid providing an integrated view of data storage is called a Data Grid. ▪ Each machine on grid provides some storage, even if temporary. ▪ Storage may be memory attached to processors, RAM, ROM or secondary devices like Hard Drive	▪ Refers to network bandwidth issued for sending one work from one computer/ machine to another. ▪ Bandwidth is critical resource and it should be redundant and efficient, else it may affect effectiveness of G.C.	▪ Refers to those s/w installed in Grid which are too expensive for installation on each member computer. ▪ Some S/W vendor permits to install such s/w on all computers in grid but at any given time, only limited no. of computer will be able to use the s/w.	▪ Different computers in a Grid will have different architectures, operating systems, devices, capacities, and equipment. ▪ Grid can use criteria for assigning job to any member of Grid. ▪ For example, some machines may be designated to only be used for medical research.

on different computers.				

16.3. Applications of Grid Computing

a) *Civil engineers* collaborate to do experimental research to design, execute, analyze, and validate different models in earthquake engineering.

b) *Insurance companies* mine data from partner hospitals for fraud detection.

c) *In scientific research,* using an entire network of computers to analyze data.

d) *In film industry,* to give special effects in a movie.

e) *In financial industry,* to forecast the future of a particular stock.

Q. Grid computing is a distributed architecture of large numbers of computers connected to solve a complex problem. With reference to this line, identify the application areas where this technology can be used effectively and efficiently.

16.4. Grid Computing Security Constraints / Issues to Consider

G.C. is a highly collaborative & distributed computing model. To develop secure Grid, following need to be considered:

a) Secured Single Sign-on	User should be needed to authenticate once & should be able to access resources, use them, & to communicate internally without further authentication.
b) Mgt. & Protection of credentials	User's credentials like User Id, Passwords, PIN should be protected.
c) Support for secure group connections	Among Grid member computers.
d) Support for multiple implementation	There should be security for multiple participants of a Grid based on public and private key cryptography.
e) Inter-operability between Grid Security & local security	Access to local computer resource should have local security & there should be Inter-operability between Grid Security & local security.
f) Standardization:	Since G.C. is highly integrated system, standardizing protocols and interfaces between Grid participants is a big issue.
g) Exportability	The code should be exportable i.e. they cannot use a large amount of encryption at a time.

Q. Prepare a list of the constraints that are required to develop Grid Computing Security.

17. Cloud Computing

- "The Cloud" refers to applications, services, and data storage on the Internet.
- These service providers rely on giant server farms and massive storage devices that are connected via Internet protocols.
- C.C. refers to accessing these computing resources remotely through internet. E.g. Google Drive, E-mail,

Netflix etc.

- It is a combination of H/w & S/w based resources delivered as a service which can be accessed online.
- The location of physical resources and devices being accessed are typically not known to the end user.

17.1. Characteristics of Cloud Computing

All the characteristics may or may not be present in a specific Cloud solution.	
a) Elasticity & Scalable	Gives the user ability to expand or reduce resources according to requirement.
b) Pay per use	User pays for cloud services only when they use it.
c) On Demand	Cloud service is not permanent part of IT infrastructure. It is availed when required.
d) Resiliency	Failure of a server or storage resource does not affect Org as work is migrated to different server in same data center or to different data center with or without human intervention.
e) Multi – Tenancy	Public cloud offers its services to multiple users making it multi-tenancy
f) Work load Management	It is related with resiliency & cost consideration. A cloud service provider may move workload from one data center to another due to: a. save cost [where operating data center is cheap] b. regulatory considerations b) better network bandwidth.

Q. What do you mean by "Cloud Computing"? Discuss its characteristics.

Q. Ms. Y is using Google Apps through which she can access any application, service and data storage facilities on the Internet and pay as-per-usage. Analyze which computing model is providing her these facilities. Also, determine the model's key characteristics.

17.2. Advantages of Cloud

a) Streamline business process	by getting more work done in less time with less resource.
b) Reduced capital Cost	No need to spend huge amount on s/w & H/w etc.
c) Reduced spending on Tech Infrastructure	as data can be accessed on demand on pay as per use basis.
d) Improved Flexibility	Fast changes can be done in work environment.
e) Pervasive Accessibility	Data can be accessed from anywhere on any device through internet.
f) Minimize maintenance	As infrastructure is maintained by cloud service provider.
g) Globalise the workforce	As people can access cloud with internet across world.
h) Achieve economies of scale	Cloud results in achieving efficient utilization of resources and that too at reduced cost. Volume output or productivity can be increased even with fewer systems and thereby reduce the cost per unit of a project or product.

17.3. Drawbacks of Cloud

a) Loss of internet connection will result in loss of Access to cloud.
b) Security is major concern as data & Application working depend on third party.
c) Scalability may be affected as No control of user on IT infrastructure.
d) While cloud service provider provides unlimited capacity to user, there may be some restrictions on services.
e) Inter-Operability- If two Apps use different cloud service providers, they may not co-operate with each other.

Q. Cloud Computing is an emerging technology that provides various service models to business organizations for storage, networking, and other services. However, many limitations are associated with this technology. Briefly explain the drawbacks of Cloud Computing. [MTP Dec 21]

17.4. Types of Cloud Computing Environment (Based on Usage & Deployment)

Private Cloud	Public Cloud	Hybrid Cloud	Community Cloud
It resides within the boundaries of Org & used exclusively for Org benefit. Also called Internal Cloud or Corporate Cloud Can be managed by single organization [on premise private cloud] or can be outsourced to third party [outsourced Pvt cloud]. Built by Internal IT Team using concepts of Virtualisation & Grid Computing	It is provisioned for open use by general public. Also called Provider Clouds. May be owned & operated by Business or Academic or Govt. organization or any combination thereon. Administrated by 3rd party vendor over Internet Sr. is offered on Pay per use basis.	It is a combination of at least 1 Private (internal) cloud & at least 1 Public (external) cloud. It may be regarded as a private cloud extended to public cloud. Aim is to use power of public cloud by retaining benefit of Private Cloud. Typically offered in either of two ways: a) A vendor has private cloud & forms a partnership with a public cloud provider or b) a public cloud vendor forms partnership with a vendor that provides private cloud platforms.	It is provisioned for exclusive use by specific community of consumers from Organizations that have shared concerns like security, compliance etc. May be owned, managed, & operated by one or more of the Org in community, a third party or a combination of them, and it may exist on or off premises. In this, a private cloud is shared between several organizations.

17.4.1. Characteristics of Cloud Computing Environment

Basis	Private cloud	Public cloud	Hybrid Cloud	Community cloud
Security & Privacy	High as it is deployed & managed by the Org itself	Less as it is offered by Third Party	Partially Secure - higher than public & lesser than private	Partially Secure - higher than public & lesser than private
Cost	Very High	Affordable	Less than Private	Cost Effective
SLA	Weak	Stringent	Stringent	Stringent
Scalability	Not Easy	Highly	Highly	Yes
Specific Points	Centralised Control	Loss of Autonomy & Privacy	Complex Mgt.	Loss of Autonomy & Privacy

Q. Explain the different types of clouds in Cloud Computing.

Q. The Prime Minister Office of a country X plans to establish specific infrastructure setup with its access shared amongst members of the group constituting of some selected high-profiled dignitaries and officers from different ministries. The objective of the group is to carry out certain assignments related to nation's security and integrity. Which is the most suitable choice of the cloud under Cloud Computing? Discuss its advantages and limitations as well.

Q. Discuss the characteristics of the Hybrid Cloud.

Q. Public cloud is the cloud infrastructure that is provisioned for open use by the general public. Explain any four characteristics of public cloud.

17.5. Types of Cloud Computing Service Model

National Institute of Standards and Technology (NIST) defines three basic service models through which cloud services are offered to users. These are as follows:

Infrastructure as a Service (IaaS)

It is a H/w level service which provides computing resources like

- Processing power
- Memory
- Network &
- Storage

to cloud users to enable them to run App on demand on pay per use basis.

IT resources are installed & managed by cloud Service provider & users use infrastructure in form of virtual machine.

Example

AWS, Google Compute Engine, OpenStack

Characteristics

a) Web Access - Enables user to Access infra over Internet. No physical access.

b) Metered Service - Allows user to rent infrastructure rather than buy it & pay on usage basis.

c) Scalability & Elasticity

d) Shared Infrastructure - Multi Tenancy

e) Centralized Management - It ensures effective Resource Management

Platform as a Service [PaaS]

It provides the user ability to

- Develop & Deploy
- app on platform provided by Sr provider.

PaaS changes Application development from local machine to online.

It provides

- Programming language
- App framework
- Database
- Testing Tools
- Other S/w development tools

Example

Google APP Engine

Microsoft Azure Compute

Software as a Service [SaaS]

It provides ability to user to access an App over internet.

S/w is installed, managed, updated & upgraded by cloud Service provider.

User get access to App on pay per use (subscription) basis.

Types

a) E-mail as a service (EaaS) -

Provides integrated system of mailing, record management, migrating, integration etc.

b) API as a service (APIaaS) -

Helps to explore functionality of web services like Google Maps, Payroll Processing etc.

c) Testing as a service (TaaS) -

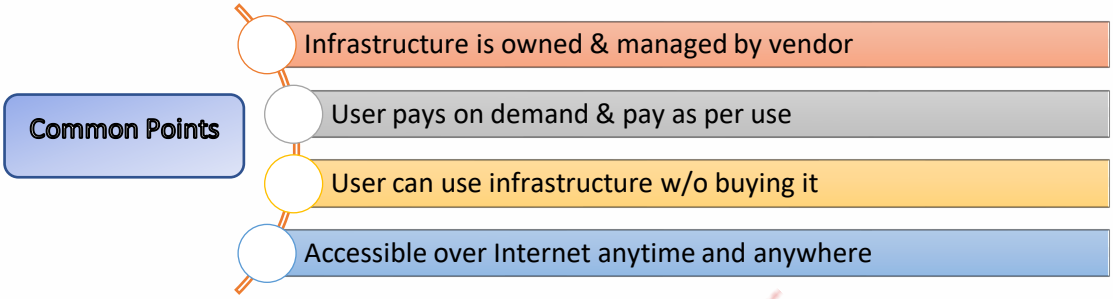
Provides s/w testing capabilities to users.

Difference between SaaS & PaaS is that PaaS represents a platform for App development, while SaaS provides online Apps that are already developed.

17.5.1. Five Instances of IaaS

Network as a service	Storage as a service	Backend as a service	Database as service	Desktop as a service

Network as a service	Storage as a service	Backend as a service	Database as service	Desktop as a service
NaaS provides data communication capacity to the user to execute data intensive activities requiring more network like video conferencing. Enables creation of virtual N/w & other N/w components.	STaaS provides storage infrastructure to user to store data online. User can access data from anywhere & anytime over Internet.	BaaS provides back-end infra to users to connect their App to cloud Infrastructure. Additional services include user mgt, push notification etc.	DBaaS provides database infrastructure to user to create, store, modify & access databases.	DTaaS enables user to use desktop virtualization without buying own infrastructure.



17.6. Other Cloud Service Models

Instance	Description
a) Communication as a Service (CaaS)	▪ It is an outsourced enterprise communication solution that can be leased from a single vender. ▪ Examples: Voice over IP (VoIP), Instant Messaging (IM), Collaboration and Videoconferencing application using fixed and mobile devices.
b) Data as a Service (DaaS)	▪ Provides data on demand to a diverse set of users, systems or application. The data may include text, images, sounds, and videos. ▪ Data encryption and operating system authentication are commonly provided for security. ▪ However, as the data is owned by the providers, users can only perform read operations on the data. DaaS is highly used in geography data services and financial data services.
c) Security as a Service (SECaaS)	▪ It is an ability given to the end user to access the security service provided by the service provider on a pay-per- use basis. ▪ It is a new approach to security in which cloud security is moved into the cloud itself whereby cloud service users will be protected from within the cloud using a unified approach to threats.
d) Identity as a Service (IDaaS)	▪ It is an ability given to the end users; typically, an organization or enterprise; to access the authentication infrastructure. ▪ Generally, IDaaS includes directory services, authentication services, risk and event monitoring, single sign-on services, and identity and profile management.

Q. ABC university wants to conduct online exams for its different courses for which a contract is given to vendor XYZ. The vendor provides computing resources such as processing power, memory, storage, and networks to ABC university users to run their online exam application on-demand. Identify the Service Model of Cloud Computing that vendor XYZ is providing to ABC university and also describe its characteristics.

Q. Ms. Anita, a final year student of undergraduate course had to submit her project report in pdf form. She initially prepared her report in MS Word and used online software from google to edit the photos used in her assignment. Later, for final submission, she used online pdf converter to convert her word file into pdf. Identify the Cloud Computing Service Model that is being used by her and further discuss the Model's different instances. [RTP Dec 21]

17.7. Pertinent Issues with Cloud Computing

Hidden cost	Unexpected Behaviour	Legal resources	Software development in cloud	Bugs in large scale distribution	Interoperability	Threshold policy
Such cost may include higher N/w charge for storage & database Apps, for users who may be located far from cloud service provider.	App may perform well at Co's internal data center but it may not work in same manner in cloud. App behaviour must be checked for unexpected behaviour. *E.g. How App allocates resources on sudden increase in demand and how it allocates unused resources	Need to adhere to several ▪ Regulatory requirement ▪ Privacy laws ▪ Data security law These laws vary from country to country & Cloud users have no control over where data is physically stored.	Developers face difficulty in developing secure Apps that can be hosted in cloud.	It's difficult to remove errors in very large-scale distributed system.	Each C.C. vendor has different APIs & format for importing/ exporting data. Industry C.C. standard do not exist. This creates problem of achieving interoperability of App b/w two C.C vendors. It is also difficult to move infra from one Cloud to another	Main objective of implementing T.P. is to Inform C.C. service provider & user about what they should do. A carefully drafted T.P. outlines* Generally, T.P is not present & only legal doc is SLA.

Q. Cloud computing is one of the emerging technologies used in several organizations, yet it has many pertinent issues. Discuss the major pertinent issues related to cloud computing.

18. Mobile Computing

- Technology that allows transmission of data via a computer/ mobile device without having to be connected to a fixed physical link (wireless).
- Users can transmit data from remote locations to other remote or fixed location, thus solving issue of 'Mobility'
- Widely established, rapidly evolving & rapidly growing across world.

18.1. KEY COMPONENTS OF MOBILE COMPUTING

Mobile Communication	Mobile Hardware	Mobile Software
Infrastructure put in place to ensure seamless & reliable communication. Includes Mobile towers, comm. protocols & data formats etc.	Handheld mobile device that receives or access service of mobility. E.g. – Portable Laptops, Tablet, laptop, mobile phone.	Actual Program that runs on mobile H/w. It is the operating system of that Appliance and is essential component that makes the mobile device operate. Apps are also being developed by Organizations for use by customers.

Q. Discuss various components of Mobile Computing.

18.2. WORKING OF MOBILE COMPUTING

a) User enters or accesses data on hand held computing device using App.

b) This new data is transmitted from hand held computing device to physical I.S. where DB shall be updated & New data is accessible to other system user as well.

c) Now, both systems i.e., handheld device & physical I.S. have same information & they are in sync.

d) This process works in same way starting from other direction.

18.3. BENEFITS OF MOBILE COMPUTING

a) Flexibility in working	It has enabled users to work from anywhere as long as they are connected to a network, thus enabling work from home or work while travelling.
b) Increased Employee Productivity	as workers can simply work efficiently and effectively from which ever location they see comfortable and suitable.
c) Improved Customer Service	For example, by using a wireless payment terminal the customers in a restaurant can pay for their meal without leaving their table.
d) Remote access to work order details	Provides mobile workforce with remote access to work order details, such as work order location, contact information, required completion date.
e) Improved Management effectiveness	Enables to improve Mgt. effectiveness by enhancing information flow & ability to control mobile workforce.
f) Facilitates excellent communication	Mobile computing facilitates excellent communication.

Q. Explain the benefits of Mobile Computing.

18.4. LIMITATIONS OF MOBILE COMPUTING

a) Insufficient Bandwidth	It uses technologies such as GPRS & **EDGE** & 3G, 4G networks which are slower than direct cable connection. Higher speed wireless LANs are inexpensive but have very limited range.
b) Security standard	Since public network is used, VPN should be carefully used.

c) Power consumption	In case power is not available, batteries are used which are expensive.
d) Human Interface with device	Small screen and small keys are hard to use.
e) Transmission Interference	Weather, terrain and the range from the nearest signal point can all interfere with signal reception. Signal in tunnel, lift, rural area may not be good.
f) Potential Health Hazard	No mobile should be used while driving as it distracts drivers. Cell phone may interfere with sensitive medical devices, thus causing health issues.

Q. Mobile Computing is an important and rapidly evolving technology that allows users to transmit data from remote location to other locations in mobility condition. Being a communication expert, identify the limitations in current scenario that impede users to use this technology frequently.

19. GREEN COMPUTING

- Study & practice of environmentally sustainable computing or IT.
- Refers to using computer & IT resources in
  - More efficient, Responsible & Environment friendly way.
- **Objective**

Reduce use of hazardous material → Maximize efficiency → Promote recycling → Bio – degradability of defunct product

19.1. GREEN COMPUTING BEST PRACTICES

Develop sustainable Green Computing plan	Recycle	Make environmentally sound purchase decision	Reduce consumption of paper	Conserve Energy
Involve all stakeholders. Includes a) Checklist b) Recycling policies c) Recommendation for purchasing G.C. d) Reduction of paper consumption e) Use cloud computing so that multiple Org share common infra. f) Create awareness about commitment to G.C.	▪ Dispose e-waste as per Govt. guidelines & regulations. ▪ Manufacturer must offer safe end of life mgt. & recycling options when product is unusable. ▪ It should recycle computer using its recycling service.	▪ Purchase IT resources based on Green Attributes. ▪ Recognize manufacturer's efforts to reduce environmental impact of product by reducing or eliminating use of environmentally sensitive material. ▪ Use shared Resources & virtualization that can help to improve resource utilization, reduce	▪ By using E-mail & electronic archiving. ▪ Online marketing rather than paper-based marketing. ▪ While printing, print both sides using smaller font size. ▪ Use 'Track changes' in E-document rather than red line correction on paper.	▪ Use LCD & LED monitors instead of CRT. ▪ Use notebook/ Laptop rather than the Desktop. ▪ Use power Management feature to turn off hard drives and displays after several minutes of inactivity. ▪ Use alternative source of energy like solar energy. ▪ Adapt more of Web conferencing instead of travelling.

		energy costs & simplify maint.		

Q. Explain the concept of green computing. How will you develop a sustainable green computing plan?
Q. Discuss some best practices of Green Computing. [RTP Dec 21]

19.2. Green IT Security Services & Challenges

- Green Security is a new research field which involves defining & investigating security solutions under the energy-aware perspective.
- The objectives of Green Security are to:
  a) Evaluate the actual security mechanisms in order to assess their energy consumption.
  b) Building new security mechanisms by considering the energy costs from the design phase.
- Need to evaluate a client's infrastructure to accommodate green technology is really a vital issue'.
- Green security can be a cost-efficient and lucrative green IT service for solution providers.

20. Bring Your Own Device (BYOD)

- It is a business policy that allows Employees to use their preferred IT device like Laptop for business purpose.
- Employees can connect personal device to corporate network to access information & application.
- It makes workspaces flexible as it enables employees to work beyond required hours.

20.1. Advantages of BYOD

a) Happy Employees	as Employees love to use own device at work & need not carry multiple devices.
b) Increased Employee efficiency	as he is not required to learn working on new system.
c) Lower IT Budget	Leads to financial saving as Org is not required to provide device to staffs.
d) Reduced support requirement	as Employees maintain the device on their own, resulting in cost saving.
e) Early adoption of technology	as Employees are more proactive in adopting new technologies which leads to enhanced productivity.

20.2. Emerging Threats / Disadvantages of BYOD

Network Risk	Device Risk	Application Risk	Implementation Risk
Referred as 'Lack of Device Visibility' IT practice team is unaware about total no of devices connected to Org network. This can be hazardous.	Referred as 'Loss of Device' Device can be lost or stolen causing enormous loss in terms of finance & reputation. Company trade secrets	Referred as 'App Virus & Malware' Employee's personal device may not be protected by security S/w. Org is not clear who is	Referred as 'Weak BYOD policy' Effective implementation of BYOD program should cover implementation policy along with

Network Risk	Device Risk	Application Risk	Implementation Risk
Suppose virus hits N/w & company needs to scan all devices connected to N/w. It may be possible some employee's device skip scan.	can be retrieved from a misplaced device.	responsible for device security - Organization or employee.	above technical issues. Note: A strong BYOD policy mitigate the risk.

Q. Every business decision is accompanied with a set of threats and so is BYOD program. Explain the areas in which the risks associated with BYOD program can be classified.

21. WEB 3.0

Introduction

- Web 1.0 → Initial days of Google/Prior to Google. Static page that could be read. No write, No sharing
- Web 2.0 → Dynamic page + Read & write (users can upload photos, comment on other's photo). Resulted in Social media network b/w people & people.
- Web 3.0 → Web 2.0 + such device & website are able to generate, store & share data with other compatible devices w/o human intervention.

Web 3.0

It is known as semantic web. (Study of how language is used to produce meaning).

Refers to sites wherein the computers will generate raw data on their own without direct user interaction.

It is next logical step in evolution of Internet & web-tech.

Underlying Concept: It uses

a) Semantic web tech
b) AI
c) Machine learning
d) User behavior
e) Widgets/Apps
f) User engagement depending on interest of users .

Example Content management systems along with artificial intelligence can answer questions posed by the users, because the application can think on its own and find the most probable answer, as per context

In this way, Web 3.0 can also be described as a "machine to user" standard in the internet.

21.1. COMPONENTS OF WEB 3.0

Semantic web	Web Services/Apps
▪ It provides common framework to web user that can be used to share & access data across website. ▪ It allows machines to interpret data/info so that machines are able to take decision on their own by finding and acting upon relevant data on web.	▪ Software system that supports computer to computer interaction over internet.

21.2. Future of Web Technologies

a) **Web 4.0 called "Intelligent Web"** is autonomous, proactive, content-exploring, self-learning, collaborative, and content-generating agents based on fully matured semantic & Artificial Intelligence.

Examples- Services interacting with sensors or virtual reality services.

b) **Web 5.0, "The Telepathic Web/ The Symbionet Web"** is set to be highly complex future web generation, to be present after the year 2030 in which some things such as brain implants are expected to be popular.

Brain implants will give people the ability to communicate with the internet through thought, to think of a question and open up a web page.

Any sort of payments, such as groceries, will be paid for with a microchip in the brain or the hand and all devices will be connected to the internet.

22. Internet of Things (IOT)

- IoT is a system of –
  - interrelated Computing devices, mechanical & Digital machines, animals or people with capability to
  - transfer data over internet
  - without human to human or human to machine interaction.
- Embedded with electronics, Internet connectivity, and other forms of hardware (like sensors), these devices can communicate & interact with others over the Internet, and can be remotely monitored and controlled.
- **E.g.** Washing machine with wi-fi capacity can connect themselves to home wi-fi & once connected, can be controlled through manufacture's app from anywhere.

22.1. Applications of IOT

a) All home appliances to be connected and that shall create a virtual home. Home owners can keep track of all activities in house through their hand-held devices including home security through CCTV.

b) Office machines shall be connected through net.

HR managers can see how many people had a cup of coffee from vending machine & how many are present.

How many printouts are being generated through office printer?

c) Governments can keep track of resource utilizations / extra support needed.

Under SWACHH mission government can tag all dustbins with IOT sensors. They (dustbins) generate a message once they are full.

d) Smart Wearables

e) Connected Cars

f) Smart Supply Chain

Q. Write any two application areas of Internet of Things (IOT).

22.2. Risks of IOT

Risk to User	Risk to Product Manufacturer			Technology Risk	Environmental Risk
	Impact on Business	Data storage and analytics	Intentional Obsolescence		
a) **Security** -Greatest threat. Since devices are connected to N/w, they will be hit by all N/w related risks like ▪ Hacker ▪ Bomb ▪ Trojan etc. b) **Privacy, Autonomy & Control** - Risk of loss of control over personal life as personal data may be leaked. Other major concern is Who has ownership of this personal data	Manufacturer not providing IOT will not be able to survive in future	manufacturers need to ensure that the huge data generated from IoT devices is kept secured. Hacking/Loosing this data may be distractors for entity as well as the individual	On launching new device, features of old device may be disabled or slowed down. Where a manufacturer buys another, it may not support old devices sold.	Due to Lack of technology standard & Due to variety of H/w & S/w used on different devices, it's difficult to develop App.	May have impact on house air quality due to use of heavy earth metals in devices.

23. Artificial Intelligence (AI)

- Intelligence means ability to use memory, knowledge & experience to solve a problem.
- Intelligence exhibited/ displayed by a machine is called AI.
- AI is an ability of a computer to stimulate human capabilities based on predetermined set of rules.

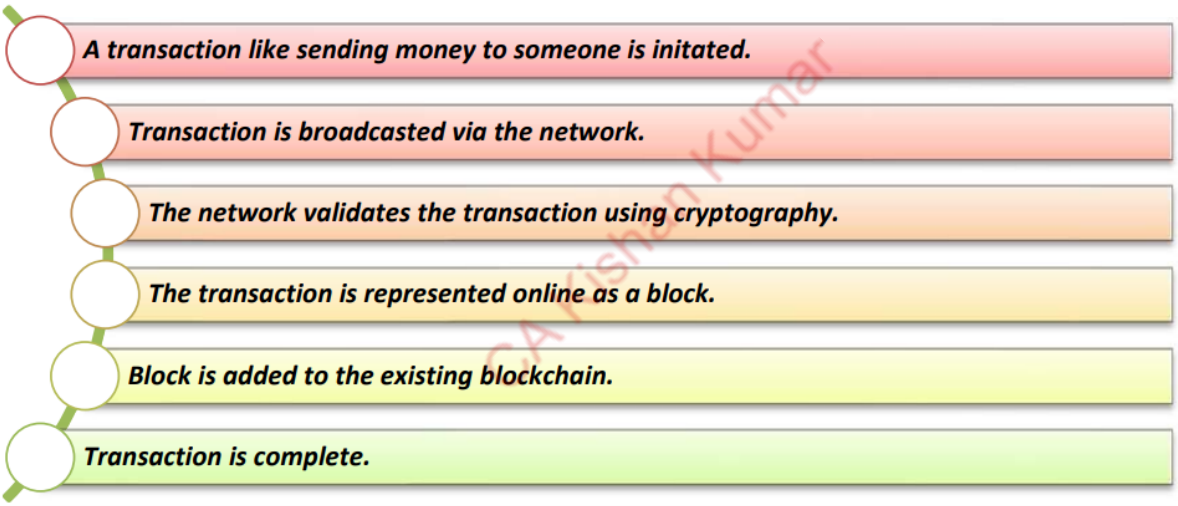
Application	Risks
➢ Autonomous vehicle (self-driving cars) ➢ Creating Art, poetry ➢ Playing online game like chess ➢ Online Assistants (SIRI, ALEXA) ➢ Medical diagnosis, in cancer Research ➢ Robotics	a) AI Relies on data it gets. Thus, incorrect Input will give incorrect conclusions. b) AI (robots) carries security threat. Countries are discussing to have a kill switch in AI capable devices otherwise someday machine may start controlling humans. c) In long term, AI may kill people's skill of thinking the unthinkable. AI can't think out of the box.

24. Machine Learning (ML)

- Application of AI that enable computers to learn automatically without being explicitly programmed.
- Science and art of programming computers so that they can learn from data & can change when exposed to new data.
- Machine learning can be used for solving problems that either are too complex for traditional approaches or have no known algorithm such as speech recognition.
- Application & risks are similar to AI.

25. BLOCKCHAIN

- Blockchain, sometimes referred to as Distributed Ledger Technology (DLT) is a
  - shared, peer-to-peer, & decentralized (not controlled by any bank, corporation, or government)
  - open ledger of transactions system with
  - no trusted third parties in between.
- This ledger database has every entry as permanent as it is an append-only database which cannot be changed or altered. All transactions are fully irreversible with any change in the transaction being recorded as new transaction.
- A blockchain generally uses a chain of blocks, with each block representing the digital information stored in public database ("the chain").
- A simple analogy for understanding blockchain technology is a Google Doc. When we create a document and share it with a group of people, the document is distributed instead of copied or transferred. This creates a decentralized distribution chain that gives everyone access to the document at the same time. No one is locked out awaiting changes from another party, while all modifications to the document are being recorded in real-time, making changes completely transparent.



25.1. APPLICATIONS OF BLOCKCHAIN

a) Financial Services	Used to provide transaction log of any transaction of asset - whether physical or digital such as laptops, automobiles, real estate, etc. from one person to another.
b) Healthcare	Provides secure sharing of medical data by increasing the privacy, security, and interoperability of the data by eliminating the third party and related overhead cost.
c) Government	Improves the transparency and provides a better way to monitor and audit the transactions like land registration, vehicle registration & management, e-voting etc.
d) Travel Industry	Can be applied in in storing important documents like passports/other identification cards, reservations and managing travel insurance, loyalty, and rewards.
e) Economic Forecasts	Makes possible financial and economic forecasts based on decentralized prediction markets, decentralized voting, and stock trading, thus enabling the organizations to plan and shape their businesses.

25.2. Risks of Blockchain

1. With the use of blockchain, organizations need to consider risk with a wider perspective as different members of a particular blockchain may have different risk appetite/ risk tolerances that may further lead to conflict when monitoring controls are designed for a blockchain.

   There may be questions about who is responsible for managing risks if no one party is in-charge and how proper accountability is to be achieved in a blockchain.

2. The reliability of financial transactions is dependent on the underlying technology and if this underlying mechanism has been tampered with, it could render the financial information stored in the ledger to be inaccurate and unreliable.
3. In the absence of any central authority to administer and enforce controls, there could be a challenge in the development and maintenance of process control activities.
2. As blockchain involves humongous data getting updated frequently, risk related to information overload could potentially challenge the level of monitoring required. Furthermore, it is difficult to find competent people to design and perform effective monitoring.

25.3. Controls of Blockchain

a) Computerized continuous monitoring	As opposed to traditional manual techniques, computerized continuous monitoring techniques shall be used to perform ongoing evaluations, considering the large volume of data processed.
b) data analytics procedures	Suitable data analytics procedures shall be developed to identify and obtain relevant and quality data from the blockchain so that it can then be processed into information that subsequently can be used to support management's business processes and reporting objectives.
c) Communication methods	Communication methods shall be developed to ensure that operational changes & updates regarding use of blockchain are communicated to appropriate personnel.
d) Assessment of Unique aspects	The unique aspects of blockchain such as ➢ consensus protocols, smart contracts, and ➢ private keys, as well as factors relating to the ongoing health, governance, and overall reliability of the blockchain in use; shall be assessed thoroughly.
e) Internal and external auditors	Both internal and external auditors shall be engaged in discussions during the development or identification of a blockchain so as to make the management understand the typical auditability issues associated with using blockchain.

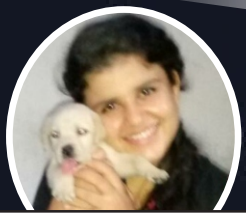
I Taught, They Learnt. I told them to Aspire. They Performed.
You too have a look & try to make Your Parents and Me Proud.
Blessings !!

KKC
simplifying the complexity

AIR 19

Rahul n Shenoy
Roll No. 543536
Marks 85

Dharini Vasudev Bhal
Roll No. 672918
Marks 77



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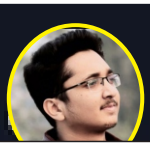

Ravi Muraka
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Nakshatra
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Amarath Kudva
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Anshul Gupta
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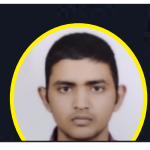

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Nikhil Niranjan
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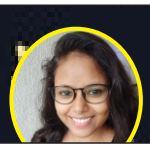

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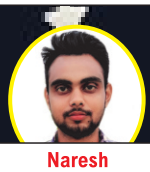

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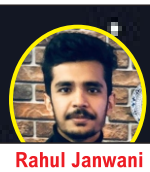

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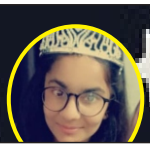

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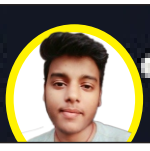

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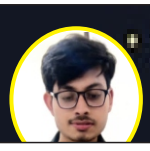

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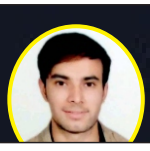

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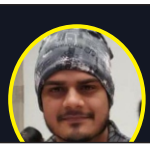

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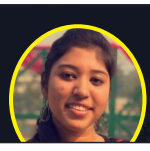

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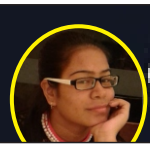

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Vinay Solanki
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Bipul Kumar Jha
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Abhishek Upadhay
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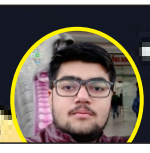

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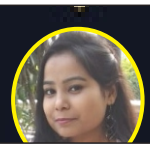

Neha Mahavar
Roll No. 626638
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Shyam Pathak
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Neha Chaudhary
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Shruti Aggarwal
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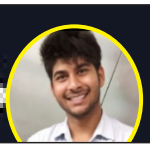
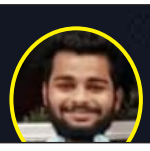
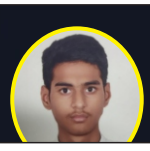


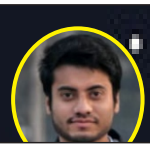
Sohan
Roll No. 518364
Marks 66



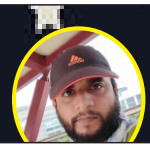
Ravi Shobhnath Pande
Roll No. 889800
Marks 66



Ayush Kumar
Roll No. 613338
Marks 65



Ashish Kumar
Roll No. 678386
Marks 65



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- Kishan Kumar is an **Associate member** of The Institute of Chartered Accountants of India.
- He is a **throughout Rankholder** in CA examinations.
- He himself scored **Exemption in Taxation [76]** in his CA Inter Exam..
- He has been **awarded by Nitish Kumar, Hon'ble Chief Minister** of Bihar for his excellence in the field of education.
- Internationally renowned **University of South Wales** has also felicitated him for his aptitude and achievements during his academic life.
- Kishan has worked with **Ernst & Young and PwC (Big 4 Firms)** and uses his practical corporate experience to make the subject more interesting and engaging.
- His students have secured **marks as high as 85** and hundreds have scored exemptions.
- He is committed to make meaningful contribution to the life of promising CA aspirants.

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