12TH COMPUTER APPLICATIONS
CHAPTER 16 (ELECTRONIC PAYMENT SYSTEMS)
Part - II

Short Answers

1. Define electronic payment system

An Electronic payment system is a financial arrangement that consists an intermediator to facilitate transfer of money-substitute between a payer and a receiver.

The term electronic payment refers to a payment made from one bank account to another bank account using electronic methods forgoing the direct intervention of bank employees.

2. Distinguish micro electronic payment and macro electronic payment (any 2)

MICRO ELECTRONIC PAYMENT	MACRO ELECTRONIC PAYMENT
It is an on-line payment system designed to allow efficient and frequent payments of small amounts.	It is an on-line payment system designed to allow efficient and frequent payments of large amounts.
In order to keep transaction costs very low, the communication and computational costs are minimized here.	In order to keep transaction costs is high, the communication and computational costs are maximized here.
The majority of micro electronic payment systems were designed to pay for simple goods on the Internet. e.g., subscriptions of online games, read journals, listen to a song or a movie online etc.	The security requirements are more rigorous in macro payment systems because of huge money transactions.
Micro electronic payment are relaxed by using light weight cryptographic primitives and off-line payment verifications.	Macro electronic payments, which use expensive public key cryptography

3. List the types of micro electronic payments based on its algorithm

- Hash chain based micro electronic payment systems.
- Hash collisions and hash sequences based micro electronic payment systems.
- Shared secrete keys based micro electronic payment systems.
- Probability based micro electronic payment systems.

4. Explain the concept of e-wallet

- Electronic wallets (e-wallets) or electronic purses allow users to make electronic transactions quickly and securely over the Internet through smart phones or computers.
- Electronic wallets were first recognized as a method for storing money in electronic form, and became popular because it provides a convenient way for online shopping.

5. What is a fork in cryptocurrency?

Many cryptocurrencies operate on the basis of the same source code, in which the authors make only a few minor changes in parameters like time, date, distribution of blocks, number of coins, etc.
These currencies are called as fork.
In fork, both cryptocurrencies can share a common transaction history in block chain until the split.

Part - III

Explain in Brief Answer

1. Define micro electronic payment and its role in E-Commerce.

- It is an on-line payment system designed to allow efficient and frequent payments of small amounts.
- In order to keep transaction costs very low, the communication and computational costs are minimized here.

Role in E-Commerce:

- The majority of micro electronic payment systems were designed to pay for simple goods on the Internet. e.g., subscriptions of online games, read journals, listen to a song or a movie online etc.
- The parties involved in the micro on-line payments are **Customer**, **Service Provider** and **Payment processor**.

2. Compare and contrast the credit card and debit card.

CREDIT CARD	DEBIT CARD
A credit card enables the bearer to buy goods or services from a vendor, based on the cardholder's promise to the card issuer to payback the value later with an agreed interest.	Debit Card is an electronic payment card where the transaction amount is deducted directly from the card holder's bank account upon authorization.
Credit card based payment systems (pay later)	Debit card based payment systems (pay now)
Every credit card account has a purchase limit set by the issuing bank or the firm	Debit cards function as ATM cards and act as a substitute for cash
instead of them paying the money back at a later with added interest.	payments using a debit card are immediately transferred from the cardholder's

3. Explain briefly Anatomy of a credit card.

All Payment cards (including debit card) are usually plastic cards of size **85.60 mm** width × **53.98 mm** height, rounded corners with a radius of **2.88** mm to **3.48** mm and thickness of **0.76 mm**. These standards dimensions are maintained universally in accordance with ISO/IEC 7810#ID-1.

1. Publisher **2. Credit card number** **3. Name of the cardholder** **5. RFID symbol**
6. Expiration month and year **7. Card brand logo** **8. Magnetic stripe**
9. Hologram **10. Signature** **11. CVC/CVV**

4. Briefly explain the stored value card and its types.

- Stored value card is a type of debit card that is pre-loaded with certain amount (value), with which a payment is made.
- The card may be disposed when the value is used, or recharged to use it again.
- The major advantage of stored value card is that customers don't need to have a bank account to get prepaid cards.
- The magnetic strip stores the monetary value of the card. Stored value cards may not have the card holder's name always.

There are **two** varieties for stored value card.

1. Closed loop (single purpose)

- Money is metaphorically stored on the card in the form of **binary-coded** data.
- It is issued by a specific merchant or merchant group and can only be used to make purchases from specific place. e.g. chennai metro rail travel card.

2. Open loop (multipurpose)

- Open loop cards can be used to make debit transaction at variety of retailers.
- It is also called as **prepaid-debit** cards.
- It can be used anywhere the branded cards are accepted. e.g. Visa gift cards

5. Write a note on mining in cryptocurrency.

- The cryptocurrency units are created by the solution of cryptographic tasks called mining.
- The miners not only generate new monetary units, but also initiate new transactions to the blockchain. As a reward, they will receive new Bitcoins.
- The process of mining is extremely electrical energy consumptive.
- the creation of cryptocurrencies may be related to the ICO (Initial Coin Offer) procedure, i.e. the ICO, aimed at gathering the initial capital necessary for the further development of the system.

Part - IV

Explain in detail

1. What is credit card? Explain the key players of a credit card payment system and bring out the merits of it.

Credit card is an electronic payment system normally used for retail transactions. A credit card enables the bearer to buy goods or services from a vendor, based on the cardholder's promise to the card issuer to payback the value later with an agreed interest.

Five Key players in operations of credit card

i. Bearer: The **holder** of the **credit card** account who is responsible for payment of invoices in full (**transactor**) or a portion of the balance (**revolver**) the rest accrues interest and carried forward.

ii. Merchant: **Storekeeper** or **vendor** who sell or providing service, receiving payment made by its customers through the credit card.

iii. Acquirer: Merchant's **bank** that is responsible for receiving payment on behalf of merchant send **authorization** requests to the issuing bank through the appropriate channels.

iv. Credit Card Network: It acts as the intermediate between the banks.

The **Company** responsible for communicating the transaction between the acquirer and the credit card issuer.

These entities operate the networks that process credit card payments worldwide and levy interchange fees. E.g. Visa, MasterCard, Rupay

v. Issuer: Bearer's bank, that issue the credit card, set limit of purchases, decides the approval of transactions, issue invoices for payment, charges the holders in case of default and offer card-linked products such as insurance, additional cards and rewards plan.

Advantages of credit card

- Most credit cards are accepted worldwide.
- It is not necessary to pay physical money at the time of purchase. The customer gets an extra period to pay the purchase.
- Depending on the card, there is no need to pay annuity.
- Allows purchases over the Internet in installments.
- Some issuers allows "**round up**" the purchase price and pay the difference in cash to make the transactions easy.

2. Briefly explain Electronic Account transfer and its types.

Apart from card based payment systems there are many alternative electronic payment systems. With the advent of computers, network technologies and electronic communications a large number of alternative electronic payment systems have emerged.

These types: **ECS** (Electronic Clearing Services), **EFT** (Electronic funds transfers), **RTGS (Real Time Gross** Settlement system)etc.

These Electronic Payment systems are used in lieu of tendering cash in domestic and international transactions.

Electronic Clearing Services (ECS)

Electronic Clearing Service can be defined as repeated transfer of funds from one bank account to multiple bank accounts or vice versa using computer and Internet technology.

The payer instructs the bank to debit from his bank account and credit it to one or more payee bank account provided amounts and dates of the payments earlier.

This system provides the convenience of paperless payments.

Advantages of this system are bulk payments, guaranteed payments and no need to remember payment dates.

ECS can be used for both credit and debit purposes i.e. for making bulk payments or bulk collection of amounts.

Electronic Funds Transfer

Electronic Funds Transfer (EFT) is the "electronic transfer" of money over an online network. The amount sent from the sender's bank branch is credited to the receiver's bank branch on the same day in batches. Banks may charge commission for using this service. EFT is a widely used method for moving funds from one account to another in B2B business models.

Real Time Gross Settlement:

Real Time Gross Settlement system (RTGS) is a payment system particularly used for the settlement of transactions between financial institutions, especially banks. As name indicates, RTGS transactions are processed at the real-time.

RTGS payments are also called as **push** payments that are initiated ("triggered") by the payer. RTGS payments are generally large-value payments, i.e. high-volume transactions.

3. Write a note on

a. Internet banking

Internet banking is a collective term for E-banking, online banking, virtual banking (operates only on the Internet with no physical branches), direct banks, web banking and remote banking.

Internet banking allows customers of a financial institution to conduct various financial transactions on a secure website operated by the banking institutions.

This is a very fast and convenient way of performing any banking transactions.

Advantages:

- The advantages of Internet banking are that the payments are made at the convenience of the account holder and are secured by user name and password. i.e. with Internet access it can be used from anywhere in the world and at any time.
- Any standard browser (e.g. Google Chrome) is adequate. Internet banking does not need installing any additional software.

b. Mobile banking

Mobile banking is another form of net banking. The term mobile banking (also called m-banking) refers to the services provided by the bank to the customer to conduct banking transactions with the aid of mobile phones.

These transactions include balance checking, account transfers, payments, purchases, etc. Transactions can be done at anytime and anywhere.

The **WAP** protocol installed on a mobile phone qualifies the device through an appropriate application for mobile session establishment with the bank's website.

Mobile Banking **operations** can be implemented in the following ways:

- contacting the call center.
- automatic IVR telephone service.
- using a mobile phone via SMS.
- WAP technology.
- Using smartphone applications.

4. What is cryptocurrency(Any 3 Points)? Explain the same.(Any 2)

A cryptocurrency is a unique virtual (digital) asset designed to work as a medium of exchange using cryptographic algorithm.

This algorithm secures the transactions by recording it in blockchain and controls the creation of additional units of the currency.

Cryptocurrency is also called as cryptocoins, e-cash, alternative currencies or virtual currencies and are classified as a subset of digital currencies.

Cryptocurrency can be defined as distributed accounting system based on cryptography, storing information about the state of ownership in conventional units.

The state of ownership of a cryptocurrency is related to individual system blocks called "**portfolios**".
The function of cryptocurrency is based on technologies such as Mining, Blockchain, Directed Acyclic Graph, Distributed register (ledger), etc.
The information about the transaction is usually not encrypted and is available in **clear** text.

Bitcoin:

- The term "cryptocurrency" began to be used after the appearance of the Bitcoin.
- Bitcoin is the most popular and the first decentralized cryptocurrency. Bitcoin payment system, was developed in 2009 by an unknown person or a group under the pseudonym "Satoshi Nakamoto".
- The SHA-256, a cryptographic hash function, has been used as a working algorithm.
- Later forks like: Namecoin, Litecoin, Bitcoin-gold and many others appeared.

Altcoins:

- Altcoins is the collective name for all cryptocurrencies that appeared after Bitcoin. The early Altcoins Litecoin and Namecoin appeared in 2011.
- Their miners sought to overcome a number of problems inherent in Bitcoin (for example, Litecoin has a higher transaction rate) or use blockchain technology in other areas (Namecoin was developed to build alternative root DNS servers).
- About 400 altcoins were considered as "dead", as their value became zero.
- These crypto-coins have advanced features such as hidden addresses and smart contracts.

Blockchain:

- Blockchains are an open distributed book that records transactions of cryptocurrencies between any two
- parties in an efficient and verifiable manner.
- It is a continuously growing list of records, called blocks, which are linked to each other and protected
- using encryption algorithm.
- Blockchains are by default resistant to data modification without the approval of a trusted authority.
- The validity of the coins of each cryptocurrency is also provided by a **blockchain**.
- Since blockchains are safely designed with high fault tolerance it is best suited to distributed computing system.

Electronic wallets

- Electronic wallets (e-wallets) or electronic purses allow users to make electronic transactions quickly and securely over the Internet through smart phones or computers.
- Electronic wallets were first recognized as a method for storing money in electronic form, and became popular because it provides a convenient way for online shopping.
- There are several electronic wallet services that are now widely used. e.g. :PayPal, SBI Buddy.

5. Explain in detail : Unified payments interface

- Unified Payments Interface (UPI) is a real-time payment system developed by National Payments Corporation of India (NCPI) to facilitate inter-bank transactions.
- It is simple, secure and instant payment facility. This interface is regulated by the Reserve Bank of India and used for transferring funds instantly between two bank accounts through mobile (platform) devices. http://www.npci.org.in/
- UPI withdraws and deposits funds directly from the bank account whenever a transaction is requested. It also provides the "peer to peer" collect request which can be scheduled and paid as per requirement and convenience.
- UPI is developed on the basis of Immediate Payment Service (IMPS). To initiate a transaction, UPI applications use two types of address - global and local.
    - **Global** address includes bank account numbers and IFSC.
    - **Local** address is a virtual payment address.

UPI – ID:

Virtual payment address (VPA) also called as UPI-ID, is a unique ID similar to email id (e.g. name@bankname) enable us to send and receive money from multiple banks and prepaid payment issuers. VPA is to generate using phone number associated with Aadhaar number and bank account number.

UPI – PIN:

The MPIN (Mobile banking Personal Identification number) is required to confirm each payment. UPI allows operating multiple bank accounts in a single mobile application. Some UPI application also allows customers to initiate the transaction using only Aadhaar number in absence VPA.

UPI Using USSD:

UPI is also available as an Unstructured Supplementary Service Data (USSD) service. Users who don't have Internet can dial *99# and get UPI services within India.

Advantages
- Immediate money transfers through mobile device round the clock 24 x 7.
- Can use single mobile application for accessing multiple bank accounts.
- Single Click Authentication for transferring of fund.
- It is not required to enter the details such as Card no, Account number, IFSC etc. for every transaction.
- Electronic payments will become much easier without requiring a digital wallet or credit or debit card.

BOOK INTERIOR QUESTIONS

Define E-Cash?
Electronic cash is (E-Cash) is a currency that flows in the form of data. It converts the cash value into a series of encrypted sequence numbers, and uses these serial numbers to represent the market value of various currencies in reality.

Define DigiCash?
In 1989, David Chaum an American cryptographer invented the first form of Cryptocurrency called "DigiCash" in the Netherlands. David Chaum, was offered with 180 million dollars by Microsoft for his DigiCash.

What is Cash on delivery(COD)?
Cash on delivery (COD) also called as collection on delivery, describes a mode of payment in which the payment is made only on receipt of goods rather in advance.
COD is often used as an additional payment option in E-Commerce.

What is Bharat Interface for Money (BHIM)?
Individual banks and financial institutions build and maintain their own mobile application for UPI transaction. Bharat Interface for Money (BHIM) is an exclusive mobile app for UPI developed by National Payments Corporation of India (NPCI) and launched on 30 December 2016.

What is Card Based Payments Systems? And its type
Payment cards are plastic cards that enable cashless payments. They are simple embossed plastic card that authenticates the card holder on behalf of card issuing company, which allows the user to make use of various financial services.
More than 90% of online payments are card based payments, at the same time other e-payment methods are also gaining importance now-a-days.
Based on the transaction settlement method there are **three** widely used card based payment systems. They are
1. Credit card based payment systems (pay later)
2. Debit card based payment systems (pay now)
3. Stored value card based payment systems (pay before)

How the micro electronic payment is works?
The Micro electronic payment transactions can be explained in the following way.
Step 1: Customer proves his authentication and the payment processor issues micro payments.
Step 2: Customer pays the micro payments to the online service provider and gets the requested goods or services form them.
Step 3: Service provider deposits micro payments received from the customer to the payment processor and gets the money.

Explain briefly Anatomy of a credit card.
All Payment cards (including debit card) are usually plastic cards of size **85.60 mm** width × **53.98 mm** height, rounded corners with a radius of **2.88** mm to **3.48** mm and thickness of **0.76 mm**. These standards dimensions are maintained universally in accordance with ISO/IEC 7810#ID-1.

1. **Publisher**: Emblem of the issuing bank (along with the sub category or scheme if any)
2. **Credit card number**: The modern credit card number has **16**-digit unique identification number.
   - The **first** digit of the credit card number is Major Industry Identifier (**MII**). It identifies the issuer category. e.g. 1 – Airlines, 4 – Banks
   - The **next 5** digits uniquely identifies the issuing organization.
   - The **first 6** digits together called as Issuer Identifier number (**IIN**) or Bank Identification number (BIN)
   - The **next 9** digits are the account number.
   - The **last** digit is a check digit (based to the Luhn algorithm).
3. **Name of the cardholder**: It is visibly embossed on the front side (additionally stored on the magnetic stripe) some cards like gift cards do not hold any name.
4. **EMV chip**: It is integrated chip in addition to magnetic stripe to store cardholder's information. EMV stands for Europay, MasterCard, Visa.
These three names correspond to the names of the companies which are responsible to develop this technology.
It is categorized into Chip-and- Signature and Chip-and-PIN.
5. **RFID symbol**: It is **four** curved lines radiating **rightwards** similar to a tilted Wi-Fi symbol. It indicates that it is a contactless smartcard.
6. **Expiration month and year**: It is visible on the front side (also stored on the magnetic stripe or chip). The card is valid until the last day of the month printed on it.
7. **Card brand logo**: It is the name of the credit card network company.
Visa and MasterCard are leading credit card network companies. Rupay is Indian domestic open loop card launched in 2012.
8. **Magnetic stripe**: It is an iron based magnetic material containing encrypted data about the card holder and account number.
9. **Hologram**: Hologram is a security feature that prevents duplication. It is a **3**-dimentional image formed by interference of light beams.
10. **Signature**: It is cardholder's signature at the back of the card, used as an attempt to identify cardholder's identity. It also holds the last **4** digits of card number.
11. **CVC/CVV**: Card Verification code/ value is a **3** digit code usually printed to the left of signature pane validates the card. CVC2 is used in contact less transactions.

ABBREVIATION:

Personal Identification Number (PIN)
One-Time Password (OTP)
An Automated Clearing House (ACH)
Indian Financial System Code (IFSC)
Virtual Payment Address (VPA)
Bharat Interface For Money (BHIM)
Cash On Delivery (COD)
Point Of Sale (POS)
Major Industry Identifier (MII)
Electronic Clearing Services(ECS)
Electronic Funds Transfers(EFT)
National Electronic Fund Transfer(NEFT)
Real Time Gross Settlement System (RTGS)
Initial Coin Offer(ICO)
Issuer Identifier number (IIN)
Bank Identification number (BIN)
Europay, MasterCard, Visa. (EMV)
Equated Monthly Instalment (EMI)
Wireless Application Protocol (WAP)
Interactive Voice Response (IVR)
Immediate Payment Service (IMPS)
Society For Worldwide Interbank Financial Telecommunication (SWIFT) Code
Institute for Development and Research in Banking Technology (IDRBT)
Card Verification Code And Card Verification Value (CVC2/CVV2)
Electronic Funds Transfer at Point Of Sale. (EFTPOS)
Mobile Banking Personal Identification Number (MPIN)
Unstructured Supplementary Service Data (USSD)
National Payments Corporation Of India (NPCI)