Page NO.

1.

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25th BATCH

COMPUTER AND COMMUNICATION ENGINEERING

International Islamic University Chittagong

COURSE CODE: CCE-3507

COURSE TITLE: System Analysis, Design and Development

COURSE TEACHER:

_____

Management Hierarchy & Information Needs

Volume of Information

→ Low Condensed (সংক্ষিপ্ত)

→ Medium Moderately processed

→ Large Detailed Reports

Type of Info

TOP Managers → Unstructured

→ Moderately Structured

→ Highly Structured

Strategic – Long range planning

Tactical – Short range improvement

Operational – Day to Day Policies

Qualities of Information:

Accurate → Ensure Correct input & processing rule

Trustworthy → Must have to have trusted source

Up to Date → Must be up to Date

Complete → Info must include all data

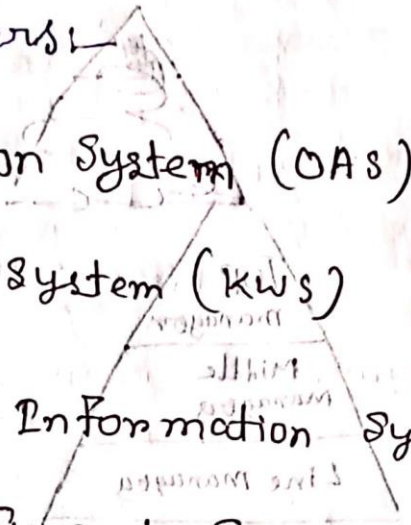
Brief → Must have summarize relevant information

Timely → Give a right time

Significant understandable → Use attractive forms & graphical chart

Relevant → understand users need

- Recommend, Design & maintain many types of systems for users:-



→ Office Automation System (OAS)

→ Kwonledge Work System (KWS)

→ Management Information System (MIS)

→ ~~Desic~~ Decision Support System (DSS)

→ Executive Support System (ESS)

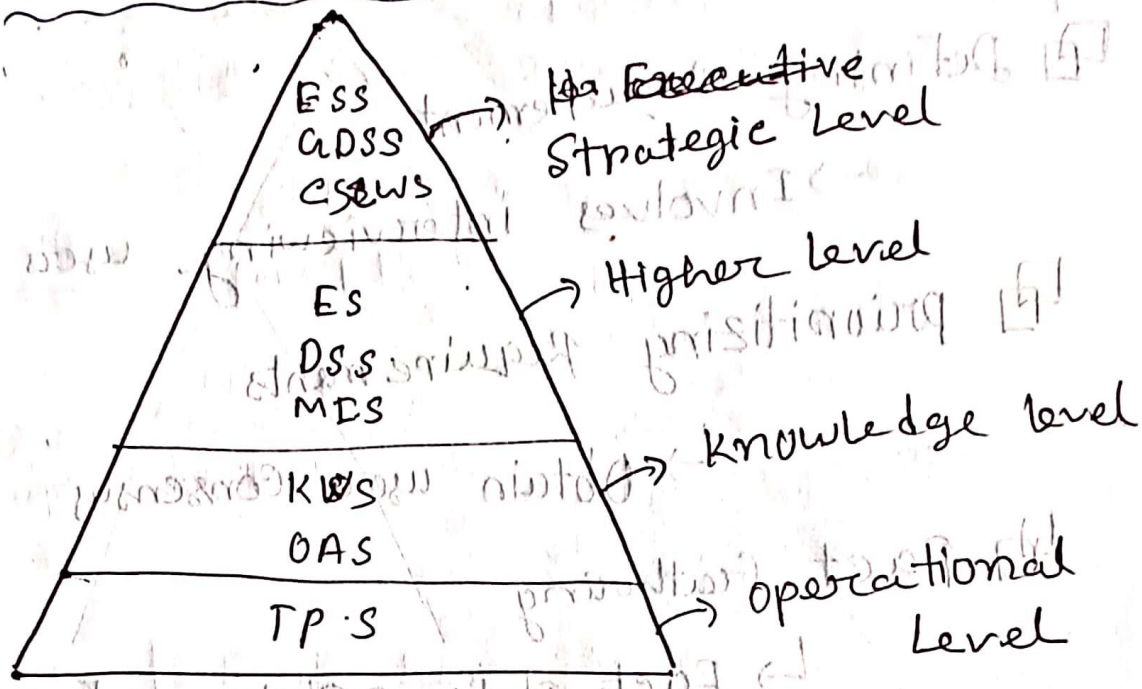
→ Group Decision ~~System~~ Support Systems (GDSS)

→ Computer-Supported Collaborative work systems (CSCWS)

→ Transaction processing Systems (TPS)

→ Expert Systems (ES)

(**) Concepts of System & its environment



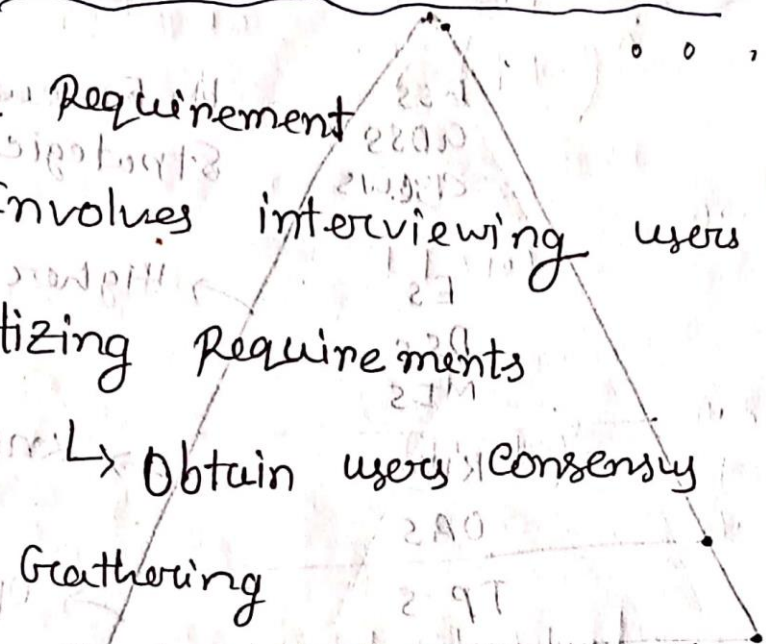
Need for System Analysis & Design:-

→ Installing a system without proper planning may lead to great user dissatisfaction & frequently causes the system to fall into disuse.

→ So, to have a better system lends the structure to the analysis & design of Information Systems.

→ A series of process systematically undertaken to improve a business through the use of computerized information systems.

Roles of the System Analyst



- Defining Requirement
  - → Involves interviewing users
- Prioritizing Requirements
  - ↳ Obtain users consensus
- Fact Gathering
  - ↳ Facts, Datas, opinions of managers
  - ↳ Lower level users should be consulted.
- Analysis & evaluation
  - → Arrive at appropriate system

~~Ceesh Flow = total cost - revenue~~

Ceesh Flow = Revenue - total cost

↳ Total Number of money being tranfered into and out of a business.

Commulitative → চলমান যোগফল যেমন

→ Then পরেরগুলো যোগ

Cost / Benefits

→ ~~Present~~ Cost का present value 0.12 फिक्स दर

Break-even

* Commulitative benefits from proposed system

Interviewing

→ An important method of collecting data on human & system information requirements.

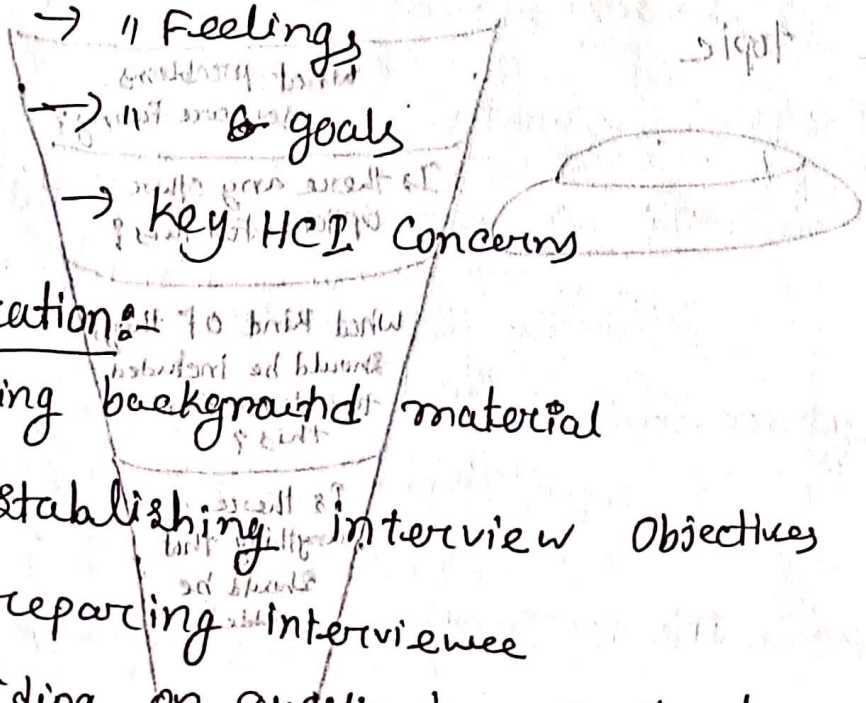
→ Reveal info about:-

→ Interviewee opinions

→ " Feelings

→ " & goals

→ key HCI Concerns



Preparation:-

→ Reading background material

→ Establishing interview Objectives

→ preparing Interviewee

→ Deciding on question types & structure

Formula:- Multiplier = $\frac{1}{(1+i)^n}$

$\frac{1}{(1+0.12)^1} = 0.89$ For 1 year

$\frac{1}{(1+0.12)^2} = 0.80$ " 2 "

0.71 " 3 "

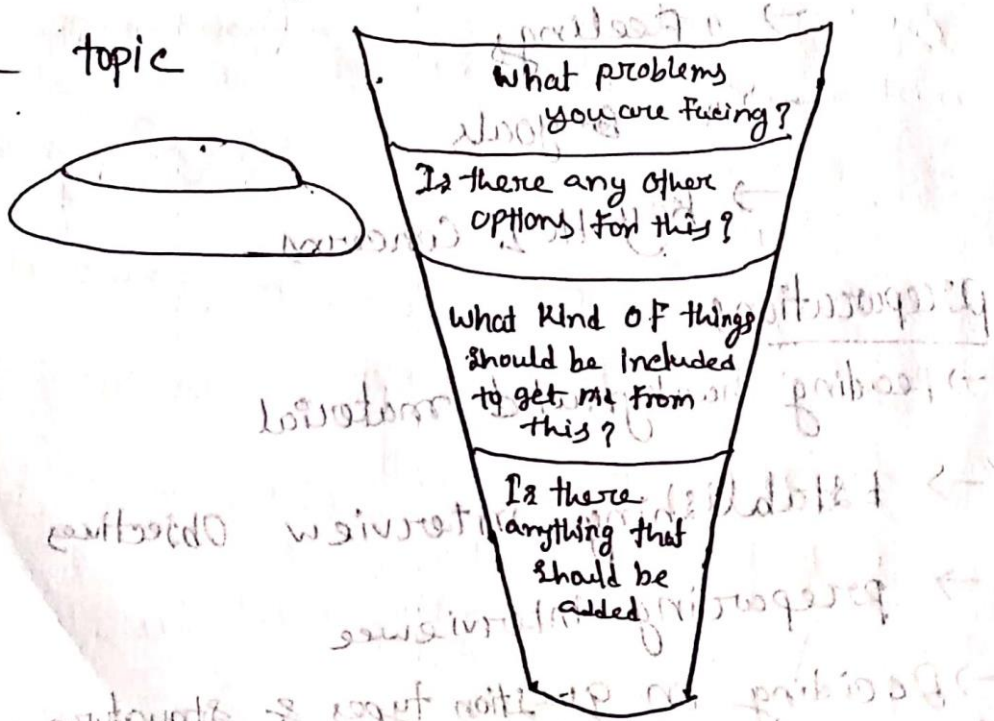
Funnel Structure

→ Begins with generalized, open-ended questions

→ possible responses using closed questions

→ Provide an easy way to begin an interview

→ Useful when the interviewee feels emotionally with the topic



Diamond Structure

→ Begins in a specific way
→ Move towards general questions
→ Specific question
→ Combines the strength of both the Pyramid & Funnel structures.
→ Takes longer than the other structures.

Closing the interview

→ Always ask, "Is there anything you would like to add?"
→ Summarize & provide Feedback on your impressions
→ Set up future appointments
→ Thanks & shake hand.

Interview Report

→ Write as soon as possible after the interview
→ Provide an initial summary, then more detail
→ Review the report with the correspondent.

Questionnaries (प्रश्नावली)

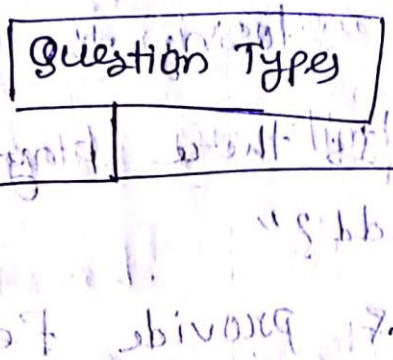
→ useful in gathering information from key organization members about;

→ Attitudes

→ Beliefs

→ Behaviours

→ Characteristics



(Anticipate the response & well suited questions For getting opinions)

(use when all the options are listed & when the options are mutually exclusive

Trade OFFs

Open-ended		Closed
SLOW	← Speed of completion →	High
HIGH	← Depth & Breadth →	SLOW
HIGH	← Exploratory Nature →	SLOW
Difficult	← Ease of analysis →	Easy
Easy	← Preparation →	Difficult

Questionnaire Language :

→ Simple → Specific

→ Short

→ Not Biased

→ Not patronizing (पृष्ठपोषक)

→ Addressed to knowledgeable

→ Technically accurate

→ Appropriate for the reading level of the respondent.

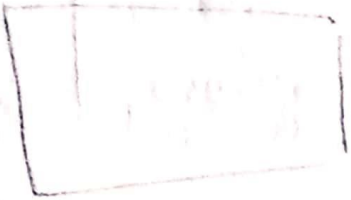
Designing the Questionnaire

→ Allow ample white space

→ Allow space ample to write or type in responses.

→ Make it easy for respondents to clearly mark their answers.

→ Consistent style



Order of questions

→ place most Important questions first

→ Keep similar content together

→ Introduce less controversial questions first

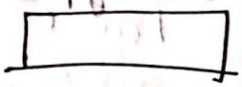
Administering questionnaire

→ Who will receive questions

→ How should questionnaire be administered

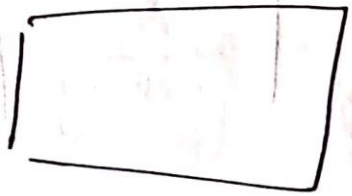
Capturing responses

* One-line text box:-



→ Used to obtain a small amount of text and limit the answer to a few words.

* Scrolling text Box → Big answers where we need to write answers as paragraph



* Check Box → yes / no
* Radio Button → yes / no or true / false

⑧ Drop Down → will have options to select

⑨ Push Button → Used as an action

Methods of administering questionnaire

→ Send all together at one time
→ personally sending the questionnaire
→ Allow respondents to responds as the questionnaire
→ Mailing questionnaire
→ Send via web or email

Arranging question

Pyramid → Close question – Open ended

Funnel → open-ended – closed questions

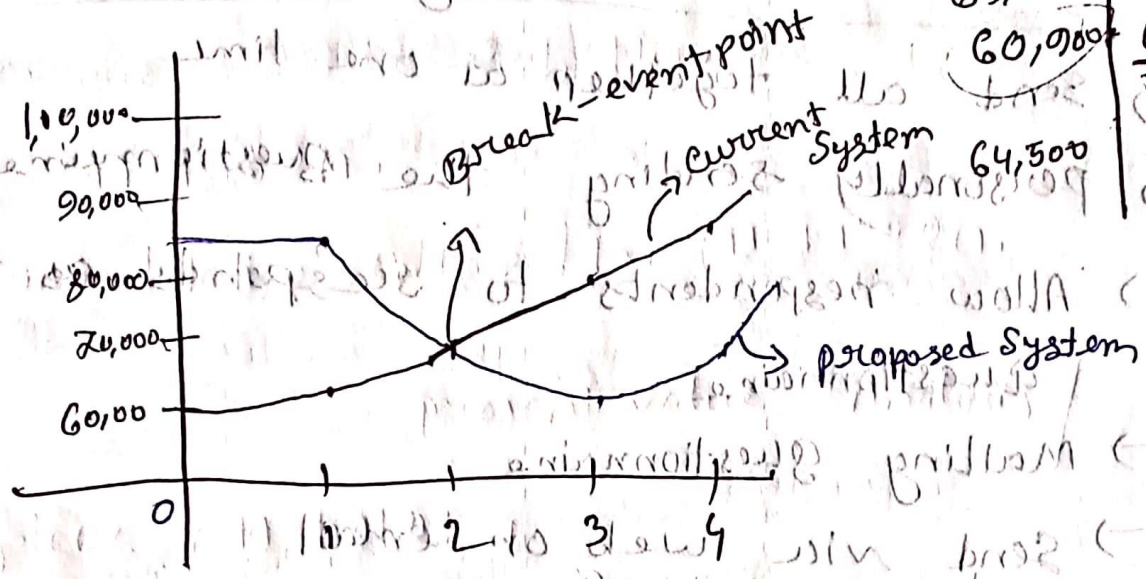
Diamond → Closed – open-ended – Closed

Break-Even :-

→ Cost of proposed System

→ Cost of current System

P.S	C.S
84,000	64,000
69,000	68,800
60,900	74,100
64,500	80,500



Pay-Back Method :-

→ Benefits → Commulitative Benefits

→ Cost → Commulitative Cost

	Cost	Commulitative cost	Benefit	Com Ben
1	84,000	84,000	55,000	55,000
2	69,000	153,000	75,000	1,30,000
3	60,900	2,13900	80,000	2,10,000
4	64,500	278,400	85,000	2,95,000

Cash - Flow

① Quarter-1, Quarter-2, ---
total cost বের করতে হবে।

② Revenue − Cost = Cash Flow
বের করতে হবে।

③ Commulitative Cash Flow বের করতে হবে।

present value - Analysis

Multiplier বের করতে: $\frac{1}{(1+i)^n}$ i = rate =
n = year / ---

i = 0.12

Question Solve:-

year-	1	2	3	4	5	6
Cost						
Cost →	33,000	34,600	36,300	38,100	40,000	42,000
Multiplier →	0.89	0.80	0.712	0.64	0.57	0.51
present value of costs →	29,370	27,660	25773	24384	22,800	21420
Total		151427				

Year —	1	2	3	4	5	6
Benefits →	21,000	26,200	32,700	40,800	51,000	63,700
Multiplier →	0.89	0.80	~~0.80~~ 0.71	0.64 ~~0.71~~	0.57 ~~0.64~~	0.51
Benefit (present worth)	18,690	20960	23,217	26112	29070	32,487

Total Cost → 150,536

1(b)

⇒ Six key benefits of a data Dictionary:-

1] Spot data Anomalies quickly.

2] Improve data quality (ডাটার গুণগত মান বৃদ্ধি করা)

3] Get a access to trustworthy data

(বিশ্বস্ত Data Access করা)

4] Foster transparency and Collaboration

(স্বচ্ছতা এবং সহযোগিতা বৃদ্ধি)

5] Facilitate regulatory Compliance.

(নিয়ন্ত্রক সম্মতি সহজতর)

6] Enable fast & accurate data analysis.

1(c)

Reasons for producing process specification :-

1) Reduce process Ambiguity (প্রক্রিয়ার অস্পষ্টতা কমানো)

2) Obtain a precise description of what is accomplished (for) programmers).
[যা সম্পন্ন করা হয় তার বিস্তৃত বিবরণ দেওয়া]

3) Validate the system design, including data Flow diagrams & the data dictionary. (Necessary Input)
[সিস্টেম ডিজাইন, ডাটা Flow Diagram এবং ডাটা ডিকশনারি যাচাই করতে হবে]

Structure English

1) Express all logic → Sequencial structure
→ Decision structure
→ Case structure
→ Iterations

2) Use and Capitalize IF, THEN, ELSE, DO & PERFORM

3) Indent blocks of statements to show their hierarchy (বিভিন্ন ধাপের ধারাবাহিকতা সহজভাবে দেখানো) clearly

4) Underline words or phrases that have been defined in a data dictionary

5) Clarify the logical statements

2(a)

Prototype benefit! –

(1) Encourages and requires active end-user participation,

(4) Factors to consider when choosing output Technology. —— (3)

3(a) 4(a)

(4) path testing

(4) Basic path testing Notes

Software এর আগে -75(b)

" " পরে → 5(c)

Topic

~~Number~~

- → Flow diagram
- → enclosed area
- → Basis path testing
  - → Enclosed Area
  - → path ✓ start note হতে last not পর্যন্ত. (যতো যে কয়টি path আছে)
- → Boundary

Tools of Analysis and Design

Data Flow diagram → 7 ta steps

- Creating the context Diagram
- Data Flow diagram:-

(Graphically characterize data process & flows in a business system)

Depict (চিত্রিত করুন):

- System
- process
- output

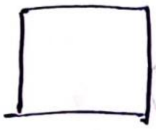
- Major Topic:-

1. Dta Data Flow diagram symbols: (চিহ্নসমূহ)
2. Data Flow diagram level. (লেভেল)
3. Creating data Flow diagram. (তৈরি করুন)
4. physical & logical data Flow diagram. (ফিজিক্যাল ও লজিক্যাল)
5. partitioning (ভাগ করুন)
6. Communicating using data Flow diagram. (যোগাযোগ)

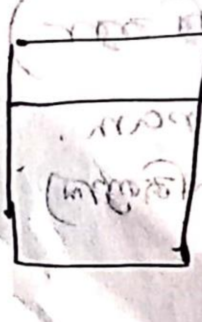
Advantage of data Flow :-

1. Freedom from Committing to the technical implementation too early
   (বাস্তবায়নের প্রতিশ্রুতি হতে স্বাধীনতা)
2. Understanding of the interrelatedness (আন্তঃসম্পর্ক) of systems & subsystem
   (সিস্টেম ও সাব সিস্টেমের আন্তঃসম্পর্কের বোঝাপড়া)
3. Communicating current system knowledge to user.
4. Analysis of the proposed system.

Symbols for data flow :-

 ⟶ Entity ⟶ Student
- Dept / a person / a machine ..
- Source / destination of data
- Outside the boundaries of system
- Noun

 ⟹ data flow ⟹ New Student info
- movement of data
- Describe with a noun
- indicate the flow of direction
- Represent data of entity

 ⟹ Process ⟹ 2.1 Create Student Record
- Change / transformation of data
- Represent work of system
- High level :- whole system / Major subsystem / subsystem to the name
- use verb

 ⟹ Data Store ⟹ D3 Student Master
- Depository for data (examination, addition, retrieval of data)
- Named with a noun
- A unique reference number :- D1, D2 ...
- Represents : i) Database (ii) computerized file (iii) Filing cabinet

Creating a Context Diagram :- (VVIm)

(ii) Highest level in a data flow diagram
(সর্বোচ্চ লেভেল DFD এর)

(iii) Contains only one process, representing the entire process
(মূল একটা প্রসেস এ সমস্ত প্রসেস নিয়ে আসে।

(iii) A process must have both input & output data flow
(প্রসেস এ ইনপুট ও আউটপুট ডাটা ফ্লো থাকে)

(iv) External entities should not be connected to one another.
(External entity একটা আরেকটার সাথে সংযুক্ত হবে না।)
[অর্থাৎ entity-1 & entity-2 এর মধ্যে সম্পর্ক থাকবে না]

Rules for Data Flow ~~Data Flow Diagram~~ Context

(1) One process

(2) [All entities must be named]

(3) Must not be any freestanding objects.
(অর্থাৎ একদম কোনো symbol থাকা যাবে না)

(4) A process must have both an input & output data flow.
(অবশ্যই একটা ইনপুট / আউটপুট থাকতে হবে)

(5) A data stope must be connected to at least one process (অবশ্যই একটা process এর সাথে connect থাকতে)

(6) External entities should not be connected to one another.
(Entity নিজেদের মধ্যে কোনো সম্পর্ক থাকবে না)

Part -A

1 (a) (Context / level-0 DFD)

Customers (order_pizza, phonenumber)

Perfect_Pizza (name, address, last_order_date)

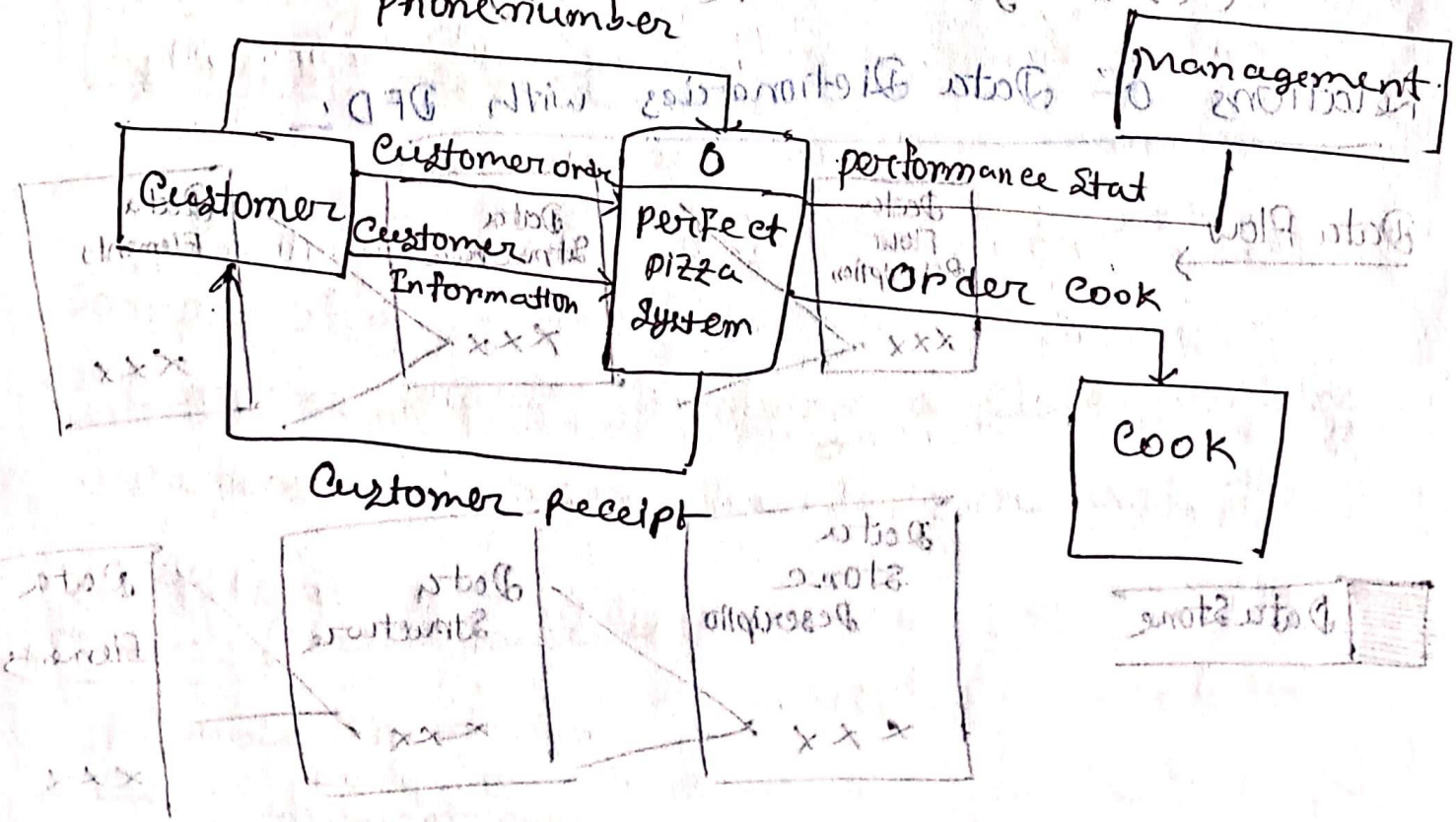
Ca Total (total_money, ~~receipt~~ receipt)

~~Cook~~ (receive_order)

Driver (~~receipt~~ coupons, receipt)

~~Comparison~~

performance (weekly, last_year's) ⇒ Management



1 (b)

Data Dictionary:-

provides complete information about an organization.

This information include:-

- → Column description
- → Distinct values, missing values & frequency
  (एकक value, मिस हुए value, फ्रिक्वेंसी)
- → Data Type
- → Classification (& glossary terms.)
  (वर्गीकरण & शब्दकोष शब्द)

Relations of Data Dictionaries with DFD:-

⇒ Each level of a Data Flow diagram should use data appropriate to that level. The more child diagrams are created the more data Flow into & out of the processes becomes more & more detailed, including structural record & elements.

2(b)

Model Driven (method) :-

- Modern structured design
- In-Formation Engineering
- prototyping
- Object-oriented

prototype :- (small scale, incomplete, but working sample of a desired system).

→ Iterative process involving a close working relationship between the designer and the users.

Benefits :- (Geeksforgeeks.)

(1) Flexible in design
(2) Easy to detect errors.
(3) Can Find missing Functionality easily.

→ (4) Can be reused by the developer for more complicated projects in future.

(5) It ensures greater level of customer satisfaction & comfort.

(6) It is ideal for online systems.

(7) Helps both users & developers to understand the system better.

(8) It can easily involve users in the development phase.

Disadvantage of prototype :-

(1) The model is costly.

(2) Poor documentation because of continuously changing customer requirements.

(3) There may be too much variation in requirements.

(4) Customer demand main product to be delivered soon after seeing it.

(5) There may be incomplete or inadequate problem analysis.

(6) There may increase the complexity of the system.

(7) Customer may not be happy after seeing it.

2(b)

Factors of output Technologies :-

(1) Who will use the output? (কে)

(2) How many people need the output? (কতজন)

(3) Where is the output needed? (কোথায়)

(4) What is the purpose? (কেন)

(5) What is the speed with which the output is needed?
(কতটুকু দ্রুত?)

(6) How frequently will the output be accessed?
(কতটুকু ঘনঘন)

(7) How long the output be stored?
(কত সময় ধরে)

(8) Regulations depicting output produced, stored and distributed.
(প্রবিধান চিত্রিত - আউটপুট যা তৈরি, সংরক্ষণ এবং বিতরণ করা হয়েছে).

(9) Initial & ongoing cost of maintenance and supplies.

(10) Human and environmental requirement

four guidelines to design of good display output:-

⇒ Keep the display simple. (সরলভাবে)

⇒ Keep the presentation consistent. (ধারাবাহিকভাবে)

⇒ Facilitate user movement among displayed output. (সহজভাবে করা)

⇒ Create an attracting & pleasing display. (আকর্ষণীয়)

3 (b)

primary Activities of the design phase of the SDLC ~~Seven phases of SDLC~~:-

(1) Identifying problems, opportunities & objectives:-

⇒ Interviewing users

⇒ Summarizing the knowledge obtained

⇒ Estimating the scope of the project

⇒ Documenting the result.

(2) Determining Human Information Requirements:-

⇒ Interviewing

⇒ Sampling and investigating hard data

⇒ Questionnaires

⇒ Prototyping

⇒ who, what, where, when, how, & why of the current system.

2(b)

Analyzing System needs:-

=> Create data flow, activity, or sequence diagrams.
=> Complete the data dictionary
=> Analyze the structured decisions made
=> prepare & present the system proposal.

Designing the recommended system:-

=> Design procedures for data entry
=> " " " human-computer interface
=> Design system controls
=> Design database and/or files
=> " backup procedures

Developing & documenting software:-

=> System analyst & programmer works together to develop any original software
=> work with users to develop effective documentation.
=> programmers design, code & remove syntactical errors from computer programs.
=> Document software with readme file, online help, FAQ's.

4 Cay

Exhaustive Testing:-

It is the ~~test~~ testing the application as a whole and covering every possible thing.
But it is not possible due to various reasons like:
Time Consuming: Sometimes there are large number of input values and manually it is not possible to test the application for all input combinations as it is time consuming.

Selective testing:-

A rational component of the teaching learning process.
It reflect the orderly development of Conceptual understanding. It select the mode of response which is least restrictive.

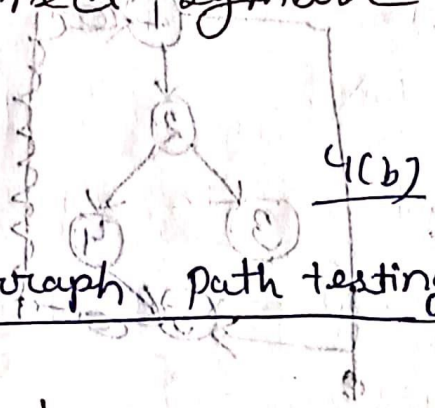
Unit Testing:- (Smallest piece of code to be tested)
what errors found during unit testing?

(1) Misunderstood or incorrect arithmetic precedence.
(2) Mixed mode operations.

(3) Incorrect Initialization

(4) precision inaccuracy.

(5) Incorrect symbolic representation.



4(b)

Flow Graph, Path testing & Find out all test cases

Understanding:-

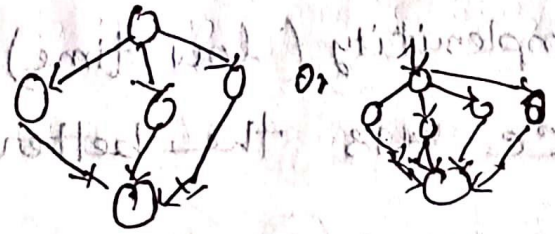
CFG (Control Flow Graph) :-

(1) → Sequence

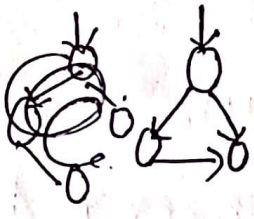
(2) if-else (3) while or any loop

or

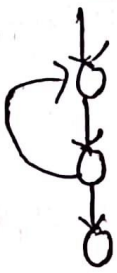
(4) Switch :-



(5) if-then-else :-



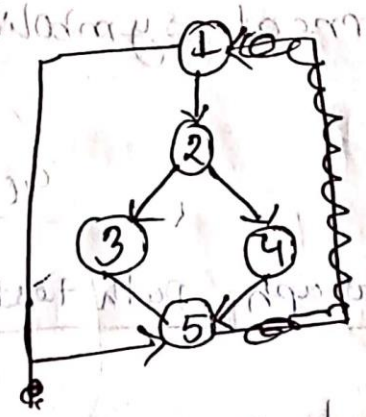
(6) do-while :-



① Drawing CFG for the give program:-

```
(1)  while (a != b) {
(2)      if (a<b)
(3)          a = a-b;
(4)      else b = b-a; {
         return a;
         }
```

CFG:-



So, Cyclomatic Complexity:- Number of Edge, E = 6

Node, N = 5

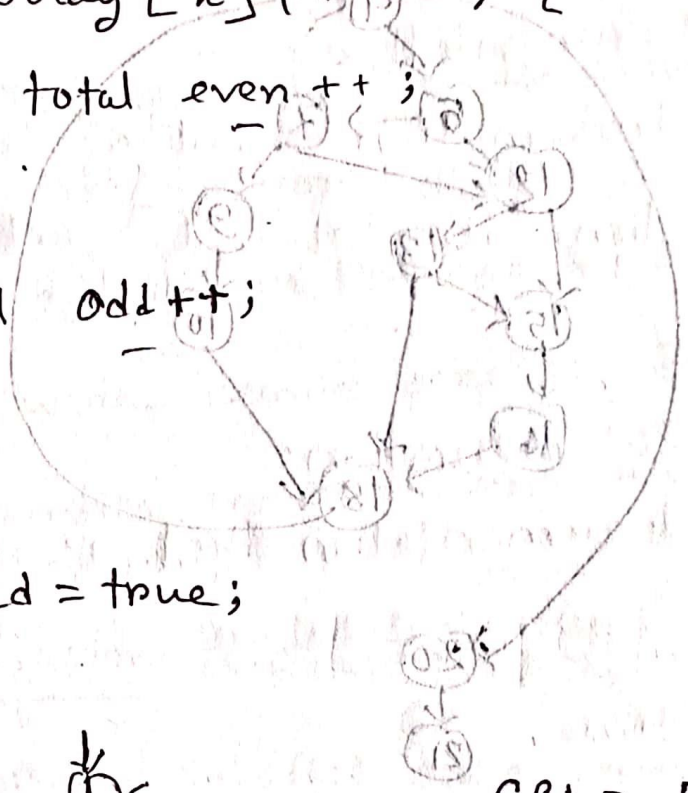
$$CC = E - N + 2$$
$$= 6 - 5 + 2$$
$$= 1 + 2$$
$$= 3$$

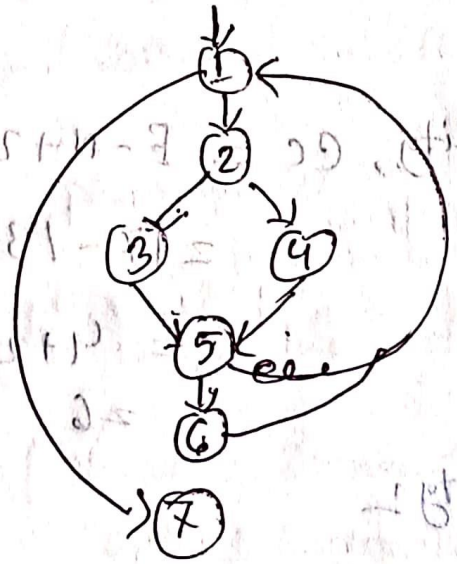
What is the benefit:-

we find time complexity (low time) with this. The more CC is the better the program would be.

Ex-02

```
(1) while (x<50){
(2)     if ( array[x]%2==0) {
(3)         total even++;
        }
    else{
(4)     total odd++;
(5)     }
(6)  x++;
    }
(7) loop ended = true;
```





$CC = E - N + 2$

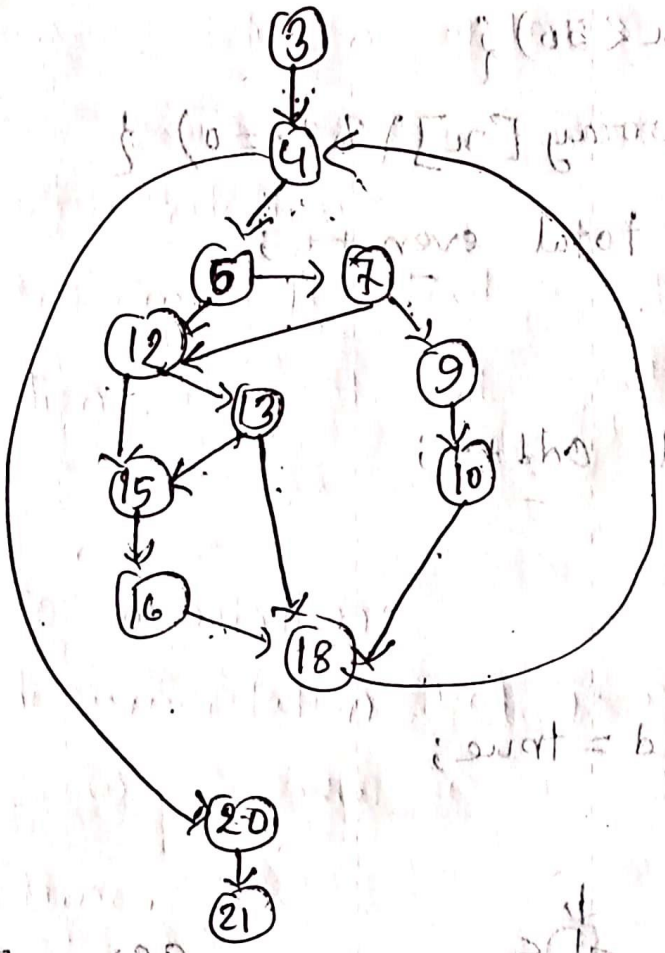
$= 7 - 8 + 2$

$= 8 - 7 + 2$

$= 1 + 2$

$= 3$

4(b)

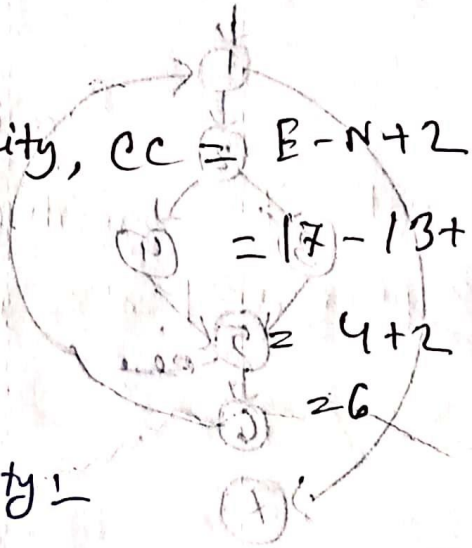


∴ Cyclomatic Complexity, CC = E - N + 2

= 17 - 13 + 2

= 4 + 2

= 6



(4c) Software Quality :-

An effective software process applied in a manner that creates a useful product that provides measurable value for both user & developer.

The definition serves three important point :-

(1) Effective software process :- It establishes the

infrastructure that supports any effort at building a high quality software.

(2) Useful product:-

It provides everything that the users desired. But it is without any error.

(3) Adding value for both the producer & the user:-

~~Bt~~ A good software provides benefits for the software organization and the end user community.

(4) Software Quality Factors :- 6 key qualities

(1) Functionality (Software satisfied stated needs)

(2) Reliability (Number of time the software is available for the use)

(3) Usability (To which the software is easy to use).

(4) Efficiency (~~To which~~ Degree to which the s/w makes optimal (সর্বোত্তম) use of system resources.

(5) Maintainability (যত সহজে repair করা যায়)

(6) portability (Software কোনো environment থেকে অন্য environment এ স্থানান্তর (transpose) করা যায়)

5 Cor

Difference between system & user documentation:-

System Documentation:-

Detailed information about a system's design specifications, its internal workings and its functionality

Internal Documentation:-

System documentation that is part of the program source code or is generated at compile time.

External Documentation:-

That includes the outcome of structured diagramming techniques (Data Flow, Entity Relationship, Data Dictionaries)

User Documentation:-

- Reference Document to Function specific Function
- Procedures manual to perform a business task
- Tutorials to use major components of the System. Designed to be read in sequence

procedure manual documenting the system, including its key sections & complaints against it:-

→ The documentation will be on English language.

Key sections:-

→ Introduction
→ How to use the software
→ What to do if things go wrong
→ A technical reference section
→ An index
→ Info on how to contact the manufacturer.

Complaints:-

→ They are poorly organized
→ It is hard to find needed information
→ The specific case in question does not appear in the manual
→ Manual is written in poor English.

Common Methods of Computer Training:-

(1) Potential Training Topics:-

- Use of the system
- General Computer Concepts
- Information Systems
- Organizational
- System Management
- System Installation

(2) Training Method:-

- Computer-aided instruction
- Formal Courses
- Software help components
- Tutorials
- Interactive training manuals
- External sources, such as vendors.

5(c)

Maintenance of Info System:-

Maintenance is the process of modifying an info system to continually satisfy organizational user requirements.

(1) Hardware Maintenance:-

The purpose of it is maintaining computer system hardware in working order. And this is maintained by equipment manufacturers by maintenance contract.

(2) Systems Maintenance:-

If there need any update or new feature the the software should be updated. The cost of it over the useful life of an application is typically twice the development cost.

3 types:-

(i) perfective Maintenance (Respond to change for user requirement

(ii) Adaptive Maintenance:- (For adapt it in a new s/w or H/w)

(iii) Corrective Maintenance (Correcting an error during operation)

Major cause of maintenance problem:-

- Unstructured code
- Insufficient knowledge about system
- Poor documentation
- Bad image of maintenance department.

6 (a)

Rental advantage:-

(1) Short term commitment (1-12 months)

(2) High Flexibility (Cancellation/ delayed purchased decision)

(3) No major cash upfront.

Disadvantage:-

- Higher monthly payments
- No major tax / ownership benefits
- Not enough security
- No control / little control on equipment change
- Not all vendors will rent.

Lease:- (Advantage)

- Commitment for 3-7 years
- Less payment that rental
- predetermined payments throughout the lease duration
- Usually better service than Rental
- System upgrade option

Disadvantage:-

- More expensive than purchase
- May have limitation on hours/equipment use

Purchase

Advantage:-

- lower cost
- Maintenance montly
- Most preferred
- Interest in any loan to finance.
- A business investment
- Full control over equipment use.

Disadvantage:-

→ Once in never out
→ Cash requirement is high
→ Complete responsibility for all problem
→ permanent Commitment

6(b)

Social Engineering, Trojan Horse, Logic bomb

Social Engineering:-

Malicious Activity that uses psychological manipulation to trick user into making security mistakes or giving away sensitive information.
It happens in one or more steps.

Trojan Horse:-

A programmed downloaded and installed on a computer that appear harmless. But is, in fact malicious.
Unexpected changes to computer settings and unusual activity, even when the computer should be idle.

Logic Bomb:-

A string of malicious code inserted intentionally into a program to harm a network when certain conditions are met.

→ Unintentional, non-malicious damage can be caused by:-

→ Human error

→ Lack of backup procedures.

→ poor training

→ Unauthorize downloading.