

# **PG Department of Computer Applications**

## **II BCA**

**Subject : DATABASE SYSTEM**

**Sub.Code : 16SCCCA4**

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**Asst.Prof. S.Indira**

## **UNIT V**

### **RELATIONAL DATABASE DESIGN**

#### **I.Features of good relational designs:**

##### **The Banking Schema**

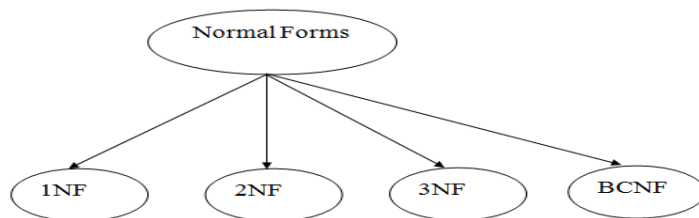
- Branch=(branch\_name,branch\_city,assets)
- Customer=(customer\_id,customer\_name,customer\_street,customer\_city)
- Loan=(loan\_number,amount)
- Account=(account\_number,balance)
- Employee=(employee\_id,employee\_name,telephone\_number,start\_date)
- Account\_branch=(account\_number,branch\_name)
- Loan\_branch=(loan\_number,branch\_name)
- Borrower=(customer\_id,loan\_number)
- Depositor=(customer\_id,account\_number)
- Works for=(worker\_employee\_id,manager\_employee\_id)
- Payment=(loan\_number,payment\_number,payment\_date,payment\_amount)
- Savings\_account=(account\_number,interest\_rate)

#### **II.Normaliation:**

- Normalization is the process of organizing the data in the database.
- Divides the larger table into the smaller table and links them using relationship.
- The normal form is used to reduce redundancy from the database table.

#### **There are the four types of normal forms**

Normal Form	Description
1NF	A relation is in 1NF if it contains an atomic value.
2NF	A relation will be in 2NF if it is in 1NF and all non-key attributes are fullyfunctional dependent on the primary key.
3NF	A relation will be in 3NF if it is in 2NF and no transition dependency exists.
4NF	A relation will be in 4NF if it is in Boyce Codd normal form and has no multi-valued dependency.
5NF	A relation is in 5NF if it is in 4NF and not contains any join dependency and joining should be lossless.



### **First Normal Form (1NF)**

- A relation will be 1NF if it contains an atomic value.
- A table cannot hold multiple values. It must hold only single-valued attribute.

**Example:** Relation PRODUCT is not in 1NF because of multi-valued attribute PRODUCT\_COLOR.

**PRODUCT table:**

Product_Id	Color	Price
1	Red,green	15
2	Yellow	23
3	Green	17
4	Yellow,blue	10
5	Red	9

**The decomposition of the EMPLOYEE table into 1NF has been shown below:**

Product_Id	Color	Price
1	Red	15
1	Green	15
2	Yellow	23
3	Green	17
4	Yellow	10
4	Blue	10
5	Red	9

**Second Normal Form (2NF):**

- In the 2NF, relational must be in 1NF.

- In the second normal form, all non-key attributes are fully functional dependent on the primary key

**Example:** Let's assume, a school can store the data of teachers and the subjects they teach. In a school, a teacher can teach more than one subject.

**TEACHER table**

TEACHER_ID	SUBJECT	TEACHER_HOUR
25	Chemistry	5
25	Biology	4
47	English	4
83	Math	6
83	Computer	5

:

**TEACHER\_DETAIL table:**

TEACHER_ID	TEACHER_HOUR
25	4
47	4
83	6

**TEACHER\_SUBJECT table:**

TEACHER_ID	SUBJECT
25	Chemistry
25	Biology
47	English
83	Math
83	Computer

### Third Normal Form (3NF)

- 3NF is used to reduce the data duplication. It is also used to achieve the data integrity.
  - If there is no transitive dependency for non-prime attributes, then the relation must be in third normal form. On-trivial function dependency  $X \rightarrow Y$ .
1. X is a super key.
  2. Y is a prime attribute, i.e., each element of Y is part of some candidate key.
  3. **Example:**

EMP_ID	EMP_NAME	EMP_ZIP	EMP_STATE	EMP_CITY
222	Harry	201010	UP	Noida
333	Stephan	02228	US	Boston
444	Lan	60007	US	Chicago

**Candidate key:** {EMP\_ID}

**EMPLOYEE table:**

EMP_ID	EMP_NAME	EMP_ZIP
222	Harry	201010
333	Stephan	02228
444	Lan	60007

**EMPLOYEE\_ZIP table:**

EMP_ZIP	EMP_STATE	EMP_CITY
201010	UP	Noida
02228	US	Boston
60007	US	Chicago

### Boyce Codd normal form (BCNF)

- BCNF is the advance version of 3NF. It is stricter than 3NF.
- A table is in BCNF if every functional dependency  $X \rightarrow Y$ , X is the super key of the table.

**Example:** Let's assume there is a company where employees work in more than one department.

**EMPLOYEE table:**

EMP_ID	EMP_COUNTRY	EMP_DEPT	DEPT_TYPE	EMP_DEPT_NO
264	India	Designing	D394	283
264	India	Testing	D394	300
364	UK	Stores	D283	232
364	UK	Developing	D283	549

**In the above table Functional dependencies are as follows:**

1.  $EMP\_ID \rightarrow EMP\_COUNTRY$
2.  $EMP\_DEPT \rightarrow \{DEPT\_TYPE, EMP\_DEPT\_NO\}$

**Candidate key:** {EMP-ID, EMP-DEPT}

The table is not in BCNF because neither EMP\_DEPT nor EMP\_ID alone are keys.

To convert the given table into BCNF, we decompose it into three tables:

**EMP\_COUNTRY table:**

EMP_ID	EMP_COUNTRY
264	India
264	India

**EMP\_DEPT table:**

EMP_DEPT	DEPT_TYPE	EMP_DEPT_NO
Designing	D394	283
Testing	D394	300
Stores	D283	232
Developing	D283	549

### EMP\_DEPT\_MAPPING table:

EMP_ID	EMP_DEPT
D394	283
D394	300
D283	232
D283	549

### Functional dependencies:

1.  $EMP\_ID \rightarrow EMP\_COUNTRY$
2.  $EMP\_DEPT \rightarrow \{DEPT\_TYPE, EMP\_DEPT\_NO\}$

### Candidate keys:

**For the first table:** EMP\_ID

**For the second table:** EMP\_DEPT

**For the third table:** {EMP\_ID, EMP\_DEPT}

Now, this is in BCNF because left side part of both the functional dependencies is a key.

### Functional Dependency

The functional dependency is a relationship that exists between two attributes. It typically exists between the primary key and non-key attribute within a table.

1.  $X \rightarrow Y$

The left side of FD is known as a determinant, the right side of the production is known as a dependent.

### For example:

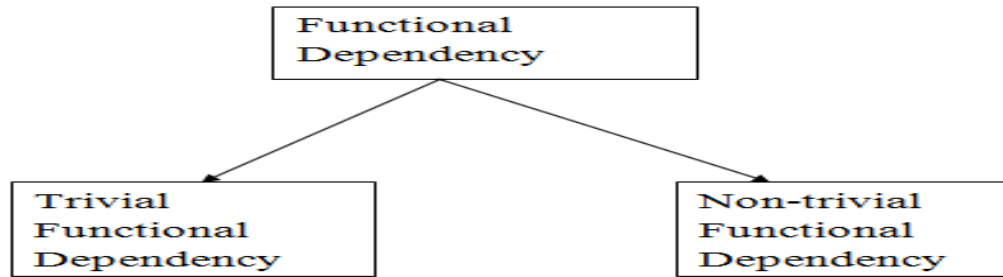
- Assume we have an employee table with attributes: Emp\_Id, Emp\_Name, Emp\_Address.
- Here Emp\_Id attribute can uniquely identify the Emp\_Name attribute of employee table because if we know the Emp\_Id, we can tell that employee name associated with it.
- Functional dependency can be written as:

1.  $Emp\_Id \rightarrow Emp\_Name$

We can say that Emp\_Name is functionally dependent on Emp\_Id.

### Types of Functional dependency

## 1. trivial functional dependency



Consider a table with two columns Employee\_Id and Employee Name.

2.  $\{\text{Employee\_id}, \text{Employee\_Name}\} \rightarrow \text{Employee\_Id}$  is a trivial functional dependency as
3. Employee\_Id is a subset of  $\{\text{Employee\_Id}, \text{Employee\_Name}\}$ .
4. Also,  $\text{Employee\_Id} \rightarrow \text{Employee\_Id}$  and  $\text{Employee\_Name} \rightarrow \text{Employee\_Name}$  are trivial dependencies too.

## 2. Non-trivial functional dependency

- $A \rightarrow B$  has a non-trivial functional dependency if B is not a subset of A.
- When  $A \cap B$  is NULL, then  $A \rightarrow B$  is called as complete non-trivial.

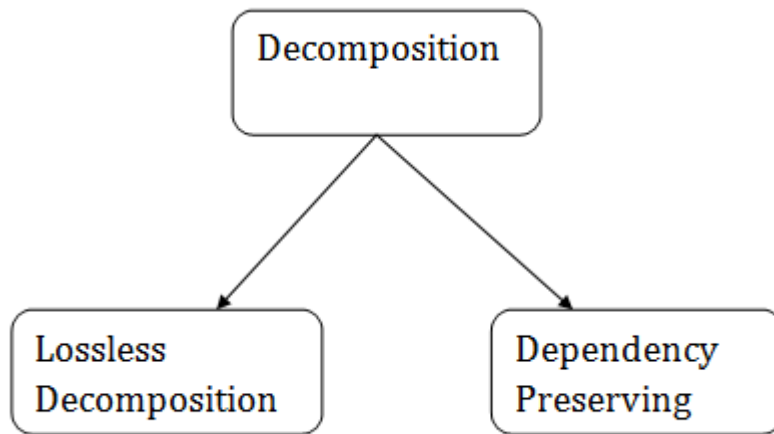
**Example:**

1.  $\text{ID} \rightarrow \text{Name}$ ,
2.  $\text{Name} \rightarrow \text{DOB}$

## **Relational Decomposition**

- When a relation in the relational model is not in appropriate normal form then the decomposition of a relation is required.
- In a database, it breaks the table into multiple tables.
- If the relation has no proper decomposition, then it may lead to problems like loss of information.
- Decomposition is used to eliminate some of the problems of bad design like anomalies, inconsistencies, and redundancy.

## Types of Decomposition



### **Lossless Decomposition**

- If the information is not lost from the relation that is decomposed, then the decomposition will be lossless.
- The lossless decomposition guarantees that the join of relations will result in the same relation as it was decomposed.
- The relation is said to be lossless decomposition if natural joins of all the decomposition give the original relation.

#### **Example:**

##### **EMPLOYEE\_DEPARTMENT table:**

EMP_I D	EMP_NAM E	EMP_AG E	EMP_CIT Y	DEPT_I D	DEPT_NAM E
22	Denim	28	Mumbai	827	Sales
33	Alina	25	Delhi	438	Marketing
46	Stephan	30	Bangalore	869	Finance
52	Katherine	36	Mumbai	575	Production
60	Jack	40	Noida	678	Testing

The above relation is decomposed into two relations EMPLOYEE and DEPARTMENT

**EMPLOYEE table:**

EMP_ID	EMP_NAME	EMP_AGE	EMP_CITY
22	Denim	28	Mumbai
33	Alina	25	Delhi
46	Stephan	30	Bangalore
52	Katherine	36	Mumbai
60	Jack	40	Noida

**DEPARTMENT table**

DEPT_ID	EMP_ID	DEPT_NAME
827	22	Sales
438	33	Marketing
869	46	Finance
575	52	Production
678	60	Testing

**Employee ⋈ Department**

EMP_ID	EMP_NAME	EMP_AGE	EMP_CITY	DEPT_ID	DEPT_NAME
22	Denim	28	Mumbai	827	Sales
33	Alina	25	Delhi	438	Marketing
46	Stephan	30	Bangalore	869	Finance
52	Katherine	36	Mumbai	575	Production
60	Jack	40	Noida	678	Testing

Hence, the decomposition is Lossless join decomposition.

## Dependency Preserving

- It is an important constraint of the database.
- In the dependency preservation, at least one decomposed table must satisfy every dependency.
- If a relation R is decomposed into relation R1 and R2, then the dependencies of R either must be a part of R1 or R2 or must be derivable from the combination of functional dependencies of R1 and R2.
- For example, suppose there is a relation R (A, B, C, D) with functional dependency set (A→BC). The relational R is decomposed into R1(ABC) and R2(AD) which is dependency preserving because FD A→BC is a part of relation R1(ABC).

## Multivalued Dependency

- Multivalued dependency occurs when two attributes in a table are independent of each other but, both depend on a third attribute.
- A multivalued dependency consists of at least two attributes that are dependent on a third attribute that's why it always requires at least three attributes.

**Example:** Suppose there is a bike manufacturer company which produces two colors(white and black) of each model every year.

BIKE_MODEL	MANUF_YEAR	COLOR
M2011	2008	White
M2001	2008	Black
M3001	2013	White
M3001	2013	Black
M4006	2017	White
M4006	2017	Black

Here columns COLOR and MANUF\_YEAR are dependent on BIKE\_MODEL and independent of each other.

In this case, these two columns can be called as multivalued dependent on BIKE\_MODEL. The representation of these dependencies is shown below:

1. BIKE\_MODEL → → MANUF\_YEAR

## 2. BIKE\_MODEL $\rightarrow \rightarrow$ COLOR

This can be read as "BIKE\_MODEL multidetermined MANUF\_YEAR" and "BIKE\_MODEL multidetermined COLOR".

### More normal form

### Fourth normal form (4NF)

- A relation will be in 4NF if it is in Boyce Codd normal form and has no multi-valued dependency.
- For a dependency  $A \twoheadrightarrow B$ , if for a single value of A, multiple values of B exists, then the relation will be a multi-valued dependency.

Example

#### STUDENT

STU_ID	COURSE	HOBBY
21	Computer	Dancing
21	Math	Singing
34	Chemistry	Dancing
74	Biology	Cricket
59	Physics	Hockey

4NF, we can decompose it into two tables:

#### STUDENT\_COURSE

STU_ID	COURSE
21	Computer
21	Math
34	Chemistry
74	Biology
59	Physics

#### STUDENT\_HOBBY

STU_ID	HOBBY
21	Dancing
21	Singing
34	Dancing
74	Cricket
59	Hockey

### Fifth normal form (5NF)

- A relation is in 5NF if it is in 4NF and not contains any join dependency and joining should be lossless.
- 5NF is satisfied when all the tables are broken into as many tables as possible in order to avoid redundancy.
- 5NF is also known as Project-join normal form (PJ/NF).

Example

SUBJECT	LECTURER	SEMESTER
Computer	Anshika	Semester 1
Computer	John	Semester 1
Math	John	Semester 1
Math	Akash	Semester 2
Chemistry	Praveen	Semester 1

**P1**

SEMESTER	SUBJECT
Semester 1	Computer
Semester 1	Math
Semester 1	Chemistry
Semester 2	Math

**P2**

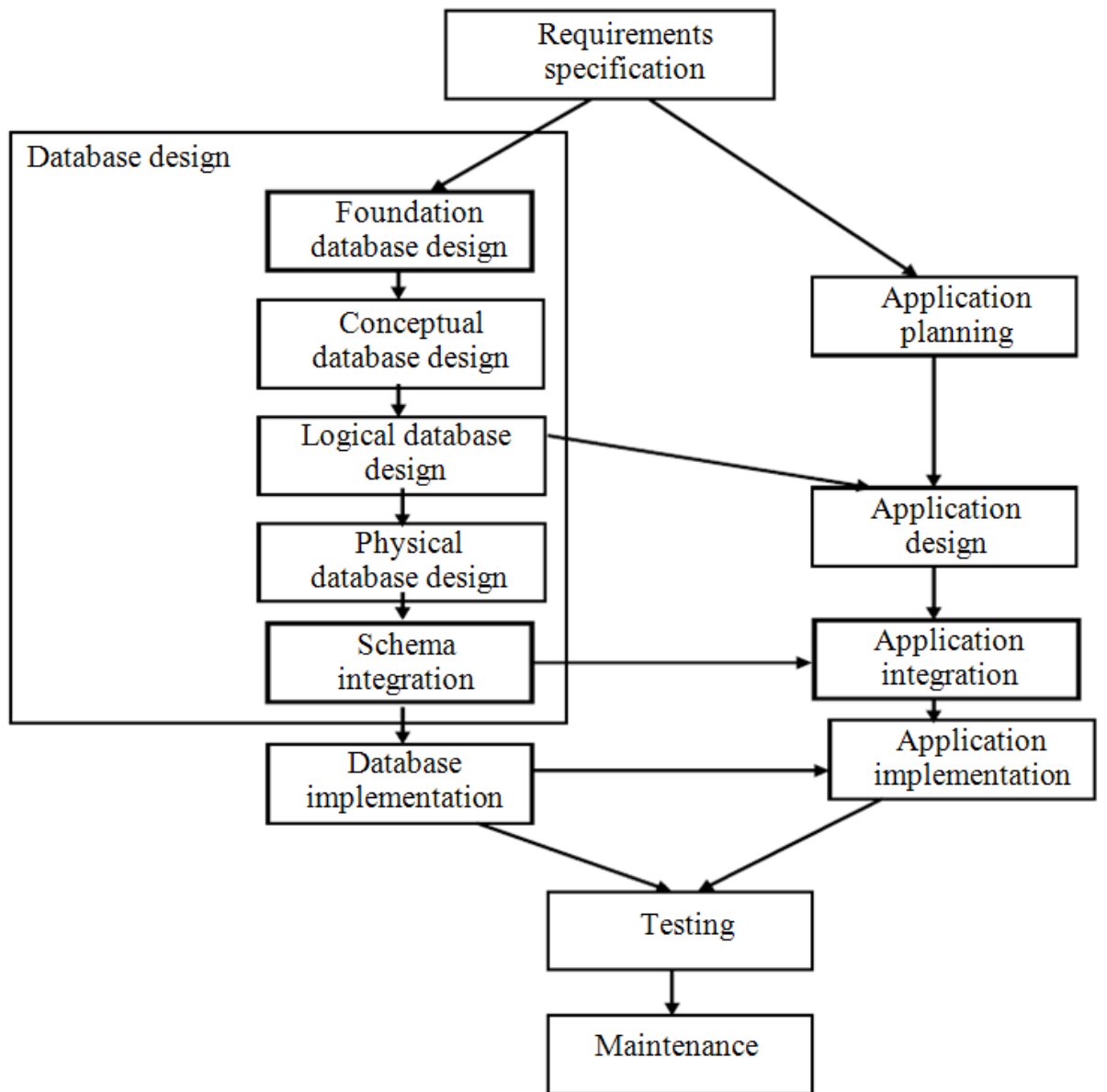
SUBJECT	LECTURER
Computer	Anshika
Computer	John
Math	John
Math	Akash
Chemistry	Praveen

**P3**

SEMSTER	LECTURER
Semester 1	Anshika
Semester 1	John
Semester 1	John
Semester 2	Akash
Semester 1	Praveen

**Database design process:****The design process consists of the following steps:**

1. Determine the purpose of your database. ...
2. Find and organize the information required. ...
3. Divide the information into tables. ...
4. Turn information items into columns. ...
5. Specify primary keys. ...
6. Set up the table relationships. ...
7. Refine your design. ...
8. Apply the normalization rules.



**Subject : ORGANIZATIONAL BEHAVIOUR**

**Sub.Code : 16SACAOB3**

**Staff In Charge : Asst.Prof. D.Arokia Mary**

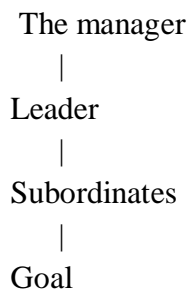
**Asst.Prof. S.Indira**

### **UNIT-V**

#### **Leadership**

- A leader is a person who guides and directs others called followers
- He gives focus to the efforts of his follows

#### **Example**



The manager as a leader influence his subordinates to indulge in such activities as are vital for the accomplishment of the Enterprise goal

#### **Definition of leadership**

##### **Allen**

According to Allen a leader is one who guides and directs other people.  
He must give effective direction and purpose.

##### **Koontz and o'dennell**

Leadership is the ability of a manager to induce subordinates to work with confidence and zeal.

##### **Chester Barnard**

Leadership is the ability of superior to influence the behavior of his subordinates and persuade them to follow a particular course of action.

**Nature of leadership      1.It is the personal quality of a power. Leadership to a considerable extend is an in born (or) an inherent quality of person.**

### **Example**

Leadership – events, Dance, Songs, Speech

**2. It is a process of influencing others. Leadership is a process of influencing others to act.**

### **Example**

The success of leadership is the willingness of the subordinates to complete with the direction of the manager.

Leadership – songs, Dance, Speech, Memikiri etc....

**3. It requires the confidence of subordinates. To be accepted as a leader the manager must gain the confidence of his subordinates**

### **Example**

Knowledge

Committed his workers

**4. It requires motivation of subordinates**

The leadership is expected to motivate (or) induce his subordinates to work.

By giving directions orders and instructions alone the manager may not be able get things done. Example

Parents  
|  
Child  
|  
Interested to game  
|  
Motivate a parent  
|  
Carrom, video games

### **Varying leadership style:**

The style of leadership vary from person to person.

### **Example**

Nature  
|  
Democraton leader  
|  
Autocratic style

**Leadership is a continuous process:**

The presence of a leader is always necessary in an organization.

Continuous process

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School.	College.	Markers
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### **Importance of leadership**

Leadership makes it possible for the employee to forget individual differences and work as a team for the attainments of the organizational objective.

Ex: Company - management - assistant manager - production manager - project - team manager.

### **To guide**

Although the subordinates have potentials they to be properly guided to contribute their best.

### **Example**

Games - tennis - video games - carrom.

- **To motivate: - Leadership is necessary to induce the subordinates to put in greater effort.**
- **To bring about changes:- Any organization has to be dynamic to accept changes caused by political, economic, technological and scientific factors.**
- **To handle crisis:- Leadership is essential for handling crisis of any kind.**

### **Qualities of a leaders**

#### **Ability to analyze**

The leader must be able to analyze any problem and offer an immediate solution.

Ex. Exam results

#### **Emotional stability**

The leader must not make decision influenced by emotional.

Ex. Hungry, sad, cry

**Self confidence: - A person cannot be a successful leader if he lacks self-confidence**

Ex. Project leader

**Foresight: - The leader must foresee what is likely to happen.**

**Sense of Judgments: - The leader must be able to judge what is good under the given circumstances.**

**Understanding: - The leader must not always thrust his views on his followers.**

**Mental courage: - The leader must be capable of taking certain bold decisions.**

**Capacity to motivate: - Needless to say the leader must be able to induce and motivate his followers to work for the mission he has undertaken.**

**Ability to guide: - The leader will be guide his followers in the work process only if he himself is well versed in the actual work.**

**Communication skills: - Successful leaders are always known for the communication skills.**

**Sociability; - The leader should not be indifferent to the need of his followers.**

**Sound physical health: - The leader must possess robust physical health.**

**Practicing what is preached: - The leader must be a person who practices what he preaches.**

**Ambition: - The leader must always be an ambitious person.**

**Positive thinking: - Last and not the least leader must be an optimist.**

#### **Functions of a leader**

**Planning: - He has to prepare suitable plans for the effective function of his group.**

**Policy making: - The leader has to evolve suitable policies that guide his group in arriving at decision.**

**Execution of plans and policies: - Preparing plans and formulating policies by itself will not serve any purpose.**

**Controlling internal relations: - The leader has to ensure that there is cordial relations among his group members and that they work in an atmosphere of proper coordination.**

**Representing the groups: - The leader has to represent his group both within and outside the organization and convey the group feelings sentiments and the stand of his group on important issues.**

**Providing reward and punishment: - If any subordinates has performed his task well and is sincere and committed to work the leader shall reward such as person suitable.**

#### **Role model**

The leader must set an example to his follows.

**Inseparable from the group: - The leader must so lead his followers that and his group must be considered as one and the same.**

**Answerability : - The leader becomes accountable or answerable not only for his actions but also for those of his followers.**

### **Different kind of leadership style**

- Autocratic
- Democratic
- Laisser faire

#### **Autocratic leader**

- An Autocratic leader wants his subordinates to work in the manner he wants.
- He tells them what they should also do, where, when, and how.
- He does not let his followers any suggestions.
- The punishment maybe in the form of fines, suspension, transfer, demotion.

#### **Merits**

- Such a leadership style is suitable when subordinates are basically lazy and shirking duties.
- As subordinates are under constant threat of disciplinary action there is always caution.
- Inefficient and insincere worker can easily be identified and removed from service.

#### **Demerits**

- Subordinates normally show resistance to this type of leadership style as it certain freedom act.
- It kills initiative for work and result in frustration among workers.

#### **Democratic leader**

- ✓ A democratic leader does not make one sided decision.
- ✓ He provides scope for his followers to participate in the decision making process.
- ✓ Democratic leader is based on the assumption that the followers are all capable.

#### **Laisser faire leader**

- ✓ The dictionary meaning of laissez faire is policy of non interference.
- ✓ A laissez faire leader gives full freedom to his followers to act.
- ✓ Leader does not exercise the formal authority of a leader.

#### **Merits**

1. Obviously as the subordinates have full freedom to act their level of motivation is bound to be very high.
2. Those subordinates who are highly efficient can make use of the freedom give to them to Excel.
3. The superior subordinates relationship is bound to be very good.

## **Demerits**

- The laissez fair leadership style will produce good results only if the subordinates are all highly efficient and capable of doing their work independent.
- The leader does not exercise his formal authority.
- As a result the work place may lose its efficient character.

## **Theories on leadership**

1. The Traits Theory
2. The Behavioral Theory
3. The Situational Theory

### **1. The Traits Theory**

Intelligent, knowledge, communication skill, Initiative, judgment, sincerity, courage, Endurance, determination, imagination, physical appearance, mental ability.

### **2. The Behavioral Theory**

- According to this theory leadership depends more on the acts of a person than on his personality traits.
- The behavior of a person attracts many followers towards him.
- The interaction between the leader, the followers, the goals and the environment will bring out the right behavior.

### **3. The Situational Theory**

- a) Leadership is much influenced by the environment or the situation in which it is exercised.
- b) The style of leadership should change according to the situation.
- c) Three major situational variables are found to influence the leader's effectiveness.
- d) They are leader-subordinates relationship.
- e) Nature of the task of the subordinates
- f) Ability of the leader to influence the subordinates.

## **Power and politics**

### **Power meaning**

Power is the capacity of a person to influence others. Authority is the official right of a person.

### **Definition**

#### **Power: -**

- a) It is the capacity of a person to influence others.
- b) It may arise due to one's knowledge and skills.
- c) It doesn't arise out of official position.

- d) Power cannot be delegate position.

### **Watter R.nord**

Power is ability to influence flours of the available through the control resources towards certain goal and as opposed to other goals.

### **White and Bedner**

Power is the ability to influence people or things usually obtained through that control of important resources.

### **Obtaining peer support**

An individual should also have the capacity to obtain the support of his equal to gain personal power.

### **Forming coalitions**

To pursue common goals individuals do combine their potential and resources to increase their capacity to influences.

### **Co - option**

It is method of bringing together all those who are dissatisfied with a certain conditions and involving them in the process of making things better.

### **Source of power**

#### **Reward power**

It refers to the leader ability to control the payment of salaries wages commission etc...  
It is based on the belief that wealth is power.

#### **Coercive power**

It is the capacity of the leader to award punishment to subordinates in the form of suspension transfer demotion etc...

Sources of power - reward power

Coercive power

Logitimate power

Referent power

Expert power

**Logitimate Power: - It is a available to a person by reason of his position.**

**Referent power: - It refers to certain unique qualities of a leader that induce his followers to emulate him.**

**Expert Power: - It access to the individual by virtue of knowledge skills.**

### **Acquisition of power**

- a) Indulging in problem showing activities
- b) In workplace most employee indulge in routine activities that may not give them prominence.

**Performing extra ordinary or usual activities**

- a) Some person acquire Power by performing certain extra ordinary or usual activities.
- b) Design a New products.
- c) Negotiating a new contract.

**Developing interpersonal relationship**

In organizational an individuals who is very good in human relations and is able to develop good interpersonal relationship may also increase his personal power.

**Securing the superior endorsement**

**Of the various subordinates a superior has only one or two many have the capacity to secure the superior endorsement to move to higher position.**

**ACQUISITION OF POWER**

- a) Problem solving activities
- b) Extraordinary activities
- c) Internal personal activities
- d) Superior endorsement
- e) Subordinates supports
- f) Peer supports
- g) Coalitions
- h) Co Option

**Getting the subordinates supports. A manager too must have the capacity to get.**

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