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- ENGINEERING DRAWING
- STANDARD QUALITY
- BASIC OF ENERGY ENVIRONMENT
- BASIC OF PROJECT MANAGEMENT
- BASIC OF MATERIAL SCIENCE
- ICT
- ETHICS AND VALUES

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BASIC OF ENERGY ENVIRONMENT

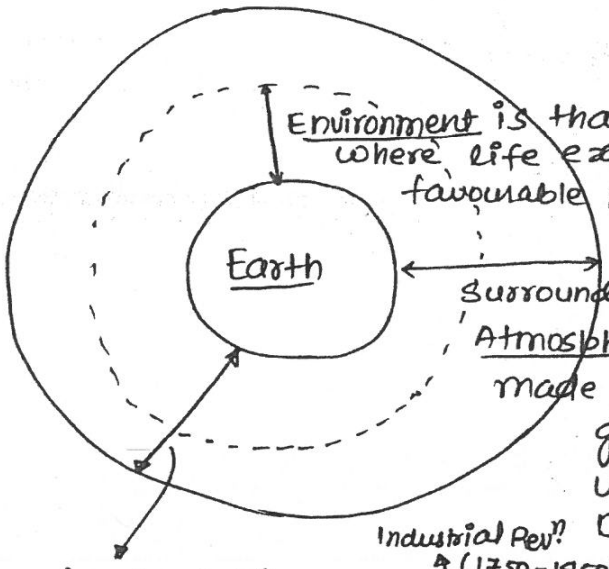
By-Vinay Tripathi Sir

- Theory
- Explanation
- Derivation
- Example
- Shortcuts
- Previous Years Question With Solution

1. Basics of Environment

Q. What is Environment?

Q. What is Atmosphere?



Environment is that surrounding of earth where life exist b/z of existence of favourable Biotic & Aboitic factors.

Surrounding of earth is K^n as Atmosphere. It is envelope made up of —

- gases
- Water Vapour
- Dust Particulate

} They are binded by gravity force of earth.

Industrial Rev^n ↑ (1750-1850) AD.

Aug. temp of Global atmosphere
- Earlies (14.8°C)
- Now (16.6°C)

} 1.8°C → Climate change, Global warming

- Environment is derieved from French word "Environer" which means surrounding of earth. Therefore surrounding of earth where life is found is K^n as Environment.

Components of Environment

There are two components of environment —

1) Biotic components (living Beings) → Ex- All Flora & Fauna (Flora → Plants, Fauna → Animals/Organisms)
2) ABiotic components (Non-living Beings)
   Ex- Sunlight, Soil, Air, water etc.

Types of Environment

Natural Environment

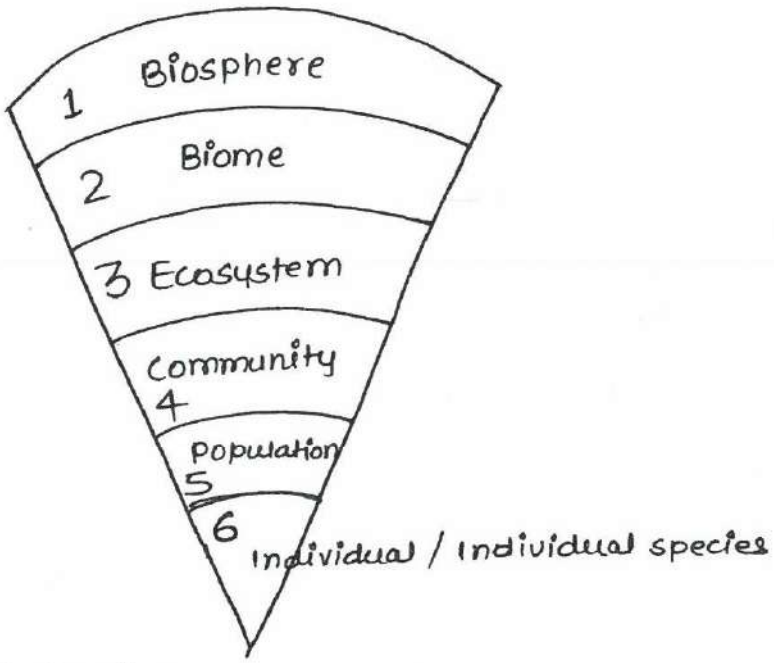
- Ex- Forest, Grassland, Equitorial Evergreen Forest, Desert etc.
- where Flora & Fauna are allowed to grow & develope in natural way w/o any external disturbance then it is k^n as Natural Envt.

Artificial Environment

- Ex- Aquarium, Zoo, Garden
- where flora & fauna are allowed to grow & developed in design way to serve the interest of Human being is k^n as Artificial Environment.

Hierarchy in Environment / Life exist at following levels in Environment.

- In Environment Hierarchy of life of Biota (flora & fauna) exist at 6 levels.



- Individual Species
  - Living beings who look alike / similar is known as Individuals from same species.

- Popⁿ → Sum of individual from same species who live in same geographical area.
- Community is sum of individuals of different species who live in same geographical area.

Ex-  + Tiger + Elephant

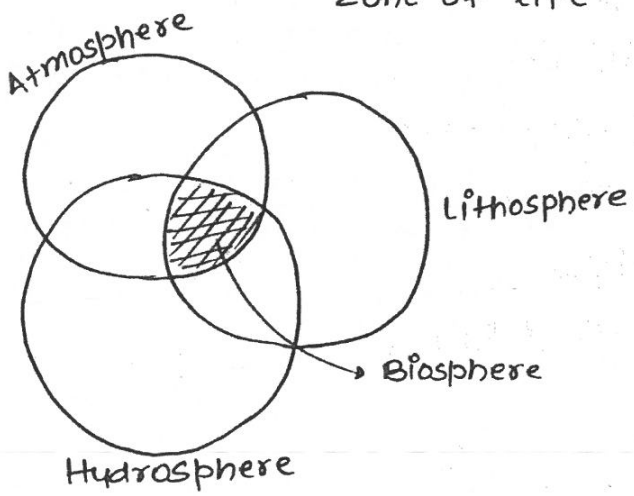
- Ecosystem : Sum of Biotic & Abiotic component of environment. (or) Community
- Biome : Sum of Homogeneous ecosystems.

Ex- Equitorial Biome

- Biosphere = Bio + Sphere

Bio → means life
Sphere → means Zone

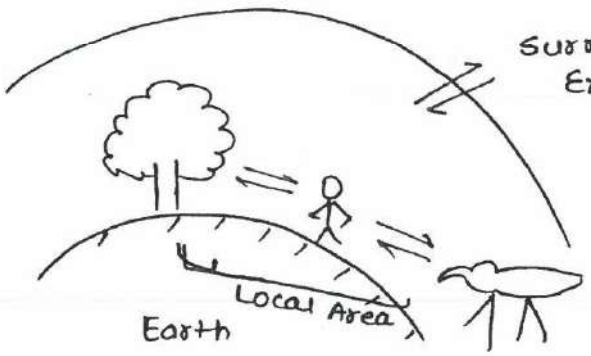
Zone of life



- Thickness of Biosphere is 25 km i.e. 16 km up in Atmosphere living bacteria has been identified & 9 km below in the Ocean micro-organism are identified.

Ecology

- Concept was given by **Ernst Haeckel** in 1866 AD.
  (German Botanist)
- Greek word
- Defination –

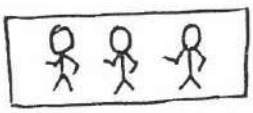


⇌ ↓ Interaction for exchange of Energy & matters

- Ecology is a branch of Science under which we used to study Interaction of Flora & fauna of a given area among themselves & their combined interaction with surrounding environment.
- Ecology is Greek word which is made from "OIKOS" & "logos". where oikos mean habbitat (or) Abode place (&) logos means to study / describe Therefore, combined meaning is "to study about Habitat of flora (or) Fauna (or) both in a given area."

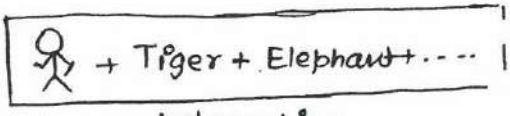
Approaches to study Ecology

- Autecology / Popⁿ Ecology



Interaction

- Synecology / community Ecology



+ Tiger + Elephant + ...

Interaction

- There are two approaches to study ecology are —

Autecology & Synecology

Autecology: Interaction is studied among individual who are from same species.

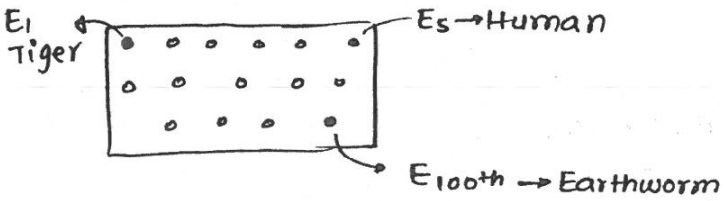
Synecology: Interaction is studied among individuals who are from different species then it is kn as community ecology.

Ecosystem

- Concept is given by A.G Tansley in 1935. However it was elebrated by E.P Odum. That's why He is known as Father of ecosystem ecology.

- Eco + System
  - Eco → Environment
  - System → Natural science → P.C(B) → Human Body System
  - System → Entity/unit made by more than 1 element then every gets affected
    - work as Integrated unit.

Appn in Environment



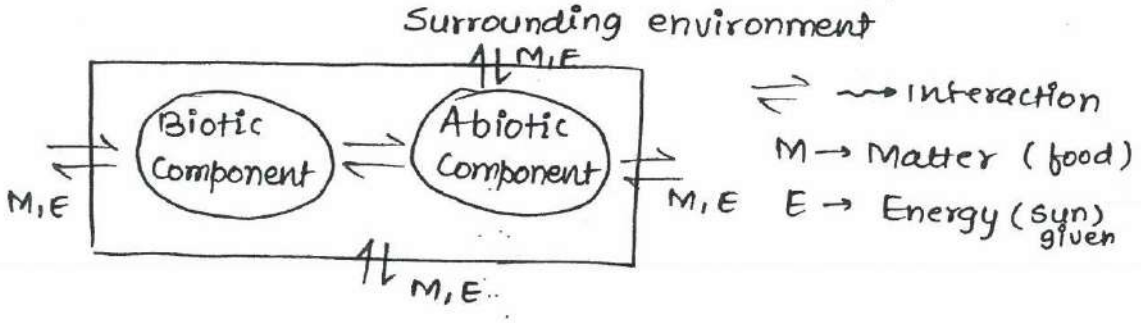
Ex- $E_1 \rightleftharpoons E_s$

Tiger ⇌ Human

- If Tiger gets instincted then there would be sudden growth of Herbivores (Deer, Rabbits etc.)
  - Overgrazing → Soil Erosion → Siltation of River bed → During rainy seasn → Flood → damage of crops → Food Insecurity in Human

Ex- E_5 = Human
E_{100} = Earthworm
} In few pockets of Punjab & Haryana b/z of overuse of Synthetic Fertilizers
↓
earthworms are extincted
↓
Infertile soil
↓
Food Insecurity in Human

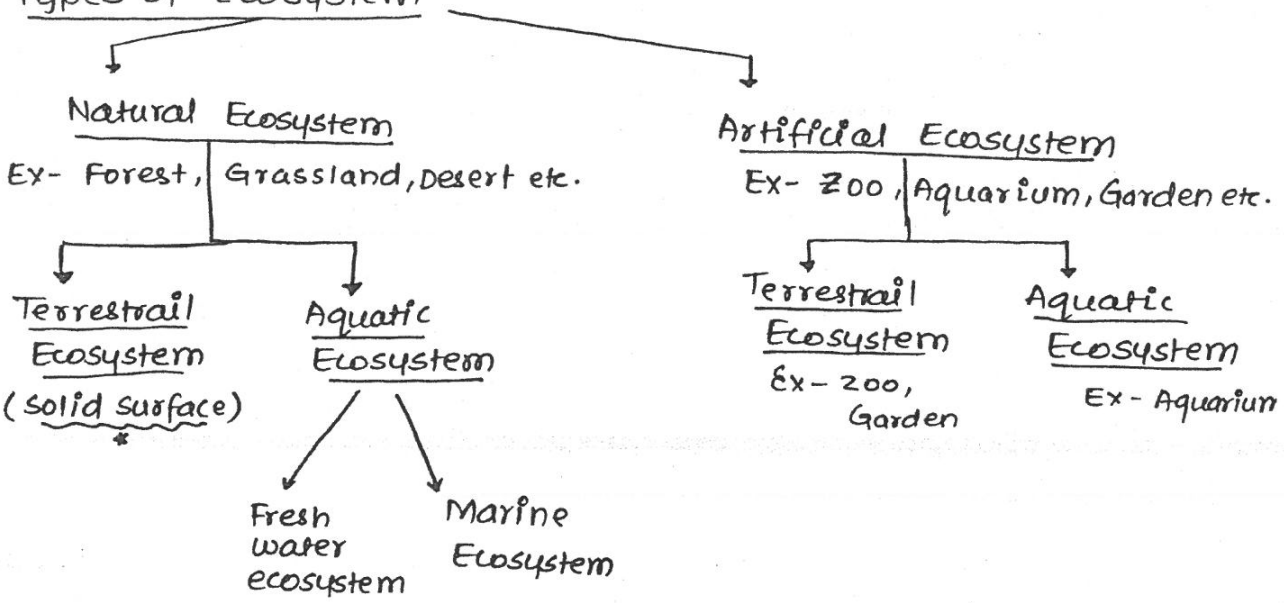
- Ecosystem is a type of open system which is found in environment & it is made from Biotic & Abiotic components where these components are interlinked & interconnected in such a way that they form fun as one entity & by functioning as one entity they interact with their surrounding envt. for exchange of energy & matters.



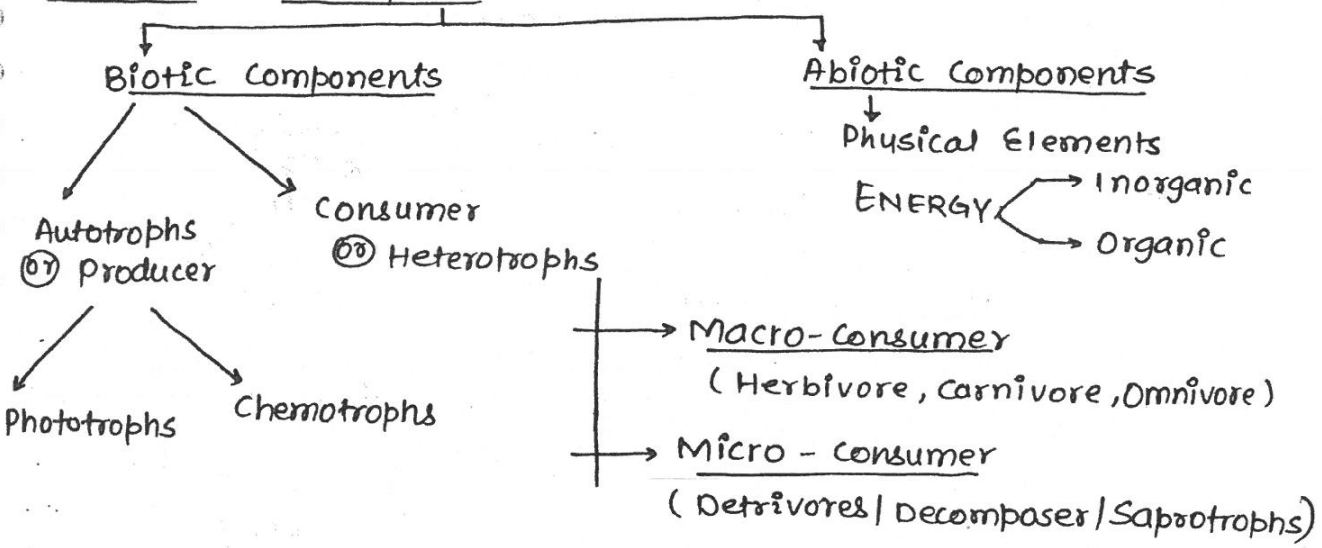
NOTE:
Ecosystem is an example of Open System.

		circulation of	Ex
→ Open System	—	E, M across boundary	⇝ Nature
Close System	—	E, ~~M~~ " "	⇝ Found in Lab
Isolated System	—	~~E~~, ~~M~~ " "	⇝ No where in reality. Exist in mental map.

Types of Ecosystem



Structure of Ecosystem

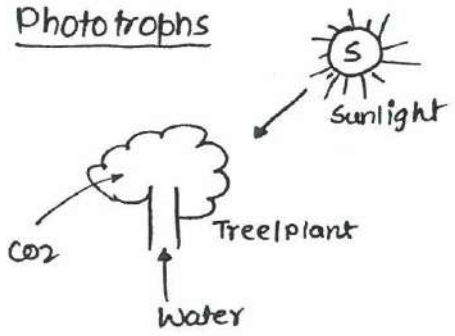


BIOTIC COMPONENTS

- **Producer / Autotrophs** - Producers are Flora living beings which make their food by themself. That's why known as **Autotrophs**.
  - Auto → Self
  - trophs → Food.

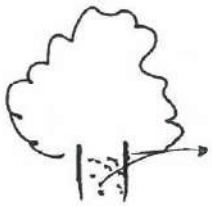
- Producer is of two types —
  1) Phototrophs
  2) Chemotrophs

Phototrophs



$$12H_2O + 6CO_2 \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$

$C_6H_{12}O_6$ → Carbohydrate (Starch)

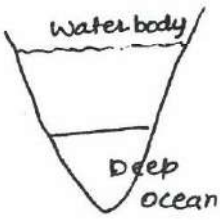


→ Biomass / Green Carbon

(or) Green Biomass.

- In presence of Sunlight, Food which is prepared by Plants through process of Photosynthesis is an example of Phototrophs.

Chemotrophs



Derived Energy

$$18H_2S + 6CO_2 + 3O_2 \xrightarrow{\text{Bacteria}} C_6H_{12}O_6 + 12H_2O + 18S$$

$18H_2S$ → Inorganic chemical cpd.

$C_6H_{12}O_6$ → Food (Carbohydrates)

Lake in Polar (or) mid-latitude area

- Example → Cynobacteria (Blue-green Algae) (unicellulas), Iron-Oxidising bacteria, Magnese-Oxidising bacteria.

(Every algae is Flora except this.)

- In case of chemotroph, Food is prepared through the process of chemosynthesis in which micro-organism play imp. role in making of food.
  Through chemosynthesis food is prepared in deep oceans. lakes which are in Polar or mid-latitude area where Sunlight is almost absent.
- In case of chemosynthesis, Micro-organism consume Inorganic chemical cpd from which they derive energy & then they convert Carbon containing molecules into Food. This whole Process is K^n as chemosynthesis.

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BY-HIMADARI SEKHAR SIR

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ENGG DRAWING

CH – 1. Introduction.

2. Scales.

3. Conic section.

4. ENGG. curves.

5. THEORY OF PROJECTION.

6. Projection of points.

7. Projection of lines.

8. Projection of planes.

9. Projection of solids.

10. Section of solids.

11. Developement of surfaces.

Introduction.

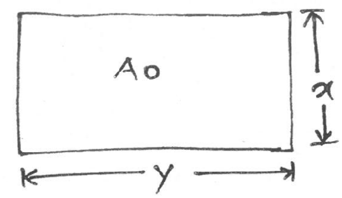
1.> Drawing sheet [IS 10711 : 2001]

- ISO A series sheet : $A_0 > A_1 > A_2 > A_3 > A_4$

*** A_0 sheet :**

- cond^n :

$$\left.\begin{aligned} x : y &= 1 : \sqrt{2} \\ x \cdot y &= 1\ m^2 \end{aligned}\right\} \begin{aligned} x &= 841\ mm \\ y &= 1189\ mm \end{aligned}$$

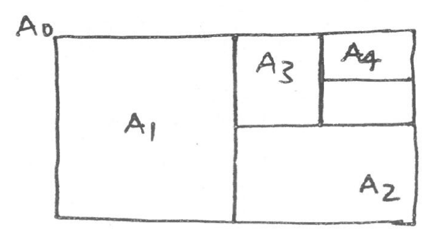


→ sucessive sheet size is obtained from previous sheet, by taking half of the longest side and maintaining the ratio $1:\sqrt{2}$.

sheet size	x	y	$x:y$	$xy\ (m^2)$
A_0	841	1189	$1:\sqrt{2}$	1
A_1	594	841	$1:\sqrt{2}$	$\frac{1}{2}$
A_2	420	594	$1:\sqrt{2}$	$\frac{1}{4}$
A_3	297	420	$1:\sqrt{2}$	$\frac{1}{8}$
A_4	210	297	$1:\sqrt{2}$	$\frac{1}{16}$

$xy\ (m^2) \rightarrow \frac{1}{2^n}$; $n = 0, 1, 2, 3 \ldots$

(each smaller dimension obtained as $\div 2$ of the longer side of the previous sheet)



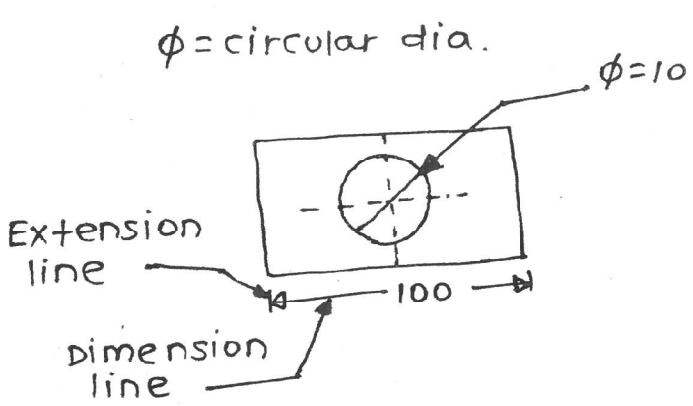
NOTE : All the scanner, printer, photocopy m/c is designed around the ratio $1:\sqrt{2}$. Hence to maintain uniformity, the same ratio is taken for the drawing sheet.

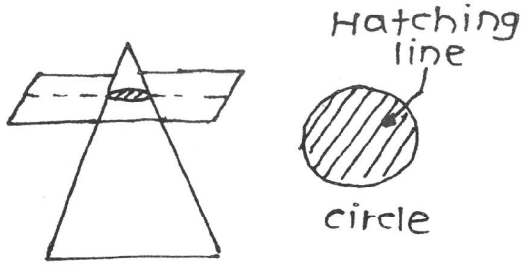
2> Lines [IS 10714 : 2001]

* Types of Lines

(i) continuous Narrow line

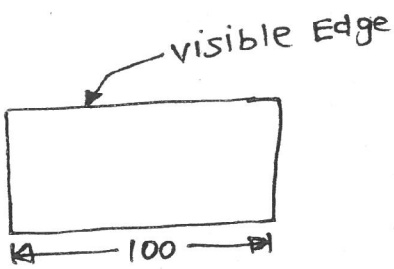
Ex- Dimension line
Extension line
leader line (↘)
Hatching (or) sectioning line.





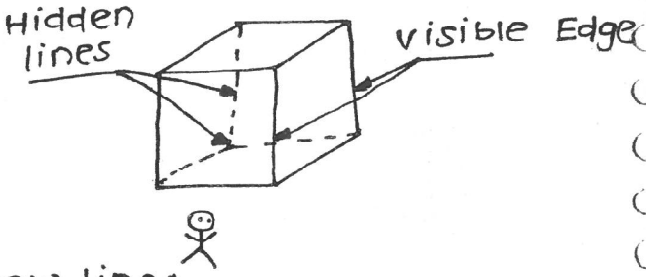
(ii) continuous wide line:

Ex: visible outline / visible Edge



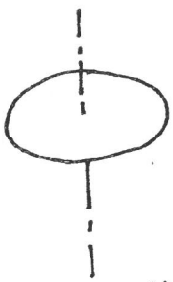
(iii) Dashed Narrow line:

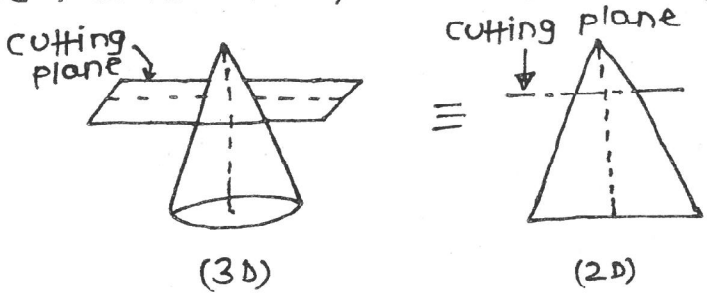
Ex: Hidden line.



(iv) LONG dash dotted Narrow line:

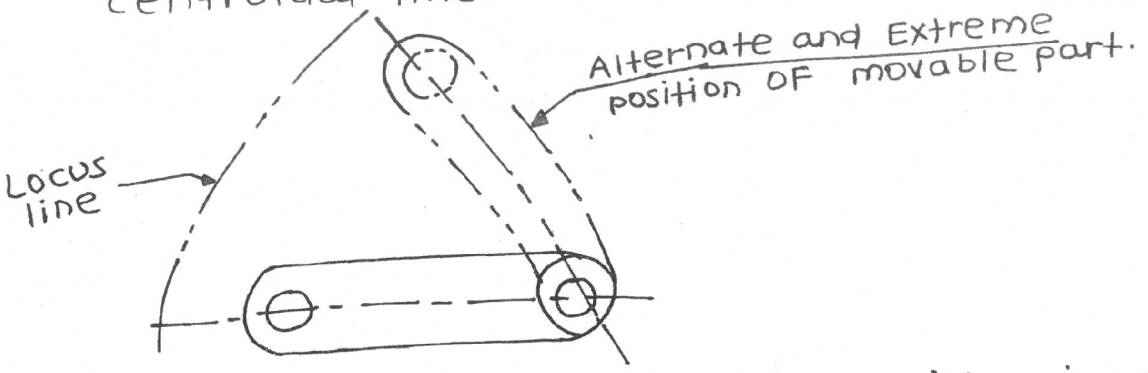
Ex: centre line, Line of symmetry, cutting plane.





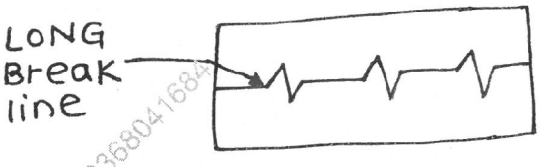
(v) LONG Dash double dotted Narrow line (phantom line)

EX: Locus line.
Alternate and Extreme position of movable part.
centroidal line.



(vi) LONG continuous Narrow line with zig-zag

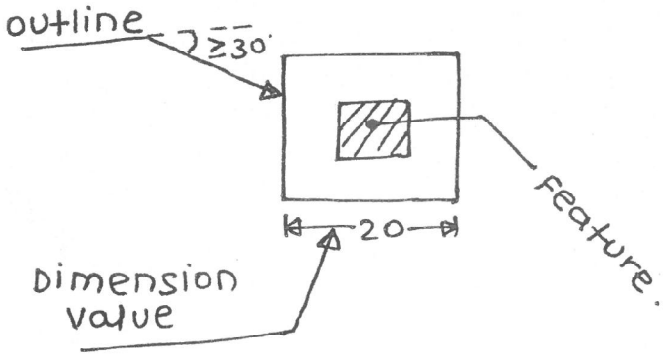
EX: LONG Break line.

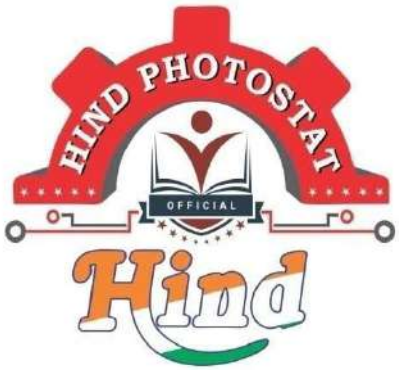


NOTE:

(i) Leader Line:

→ It is a continuous narrow line, made at an angle $\geq 30°$ which is used to refer dimension value, outline or feature of an object.





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Ethics & Values

BY-K.PATHI SIR

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ETHICS

- The word ethics come from greek word, ethika meaning character or custom.
- The word moral comes from Latin word mores/morali meaning customs.

How ethics & morals are used in Engg. ethics?

- Ethics — Greek word ethos.
- Morals — Latin word mores/Moralis
- The roots may be same but in Professional disciplines like engg. they are used to mean diff. things.

Difference blw Ethics and Morals ?

1) Meaning
   - Ethics refer to rules that govern behaviour within a Professional Context.
   - Morals refer to an individual's Personal beliefs about what is right or wrong.

2) Source
   - Ethics comes From external systems ; Professional codes, departmental rules, laws.
   - Morals comes From within ; Shaped by religion, upbringing culture, Personal reflection.

3) Focus
   - Ethics focus on what a Professional expects. (Safety, Public,
   - Moral focus on what you personally believe is right (or) wrong.

4) Application
   - Ethics apply in Professional life, Public descisions & laws.
   - Moral apply in Personal life, relationship & Private Choices.

Ethics Vs Etiquette

- Ethics refer to Principles of right & wrong that guide behaviour in terms of duty & Professional responsibility.
  Ex- Hiding safety data is unethical, accepting bribe ..etc.

- Etiquette refer to Socially accepted manners, behaviours or customs that promotes politeness in interactions.
  Ex- Eating loudly during a meeting etc.

What is ethics?

↳ A body of Prescriptions (Allowed) & Prohibitions (not allowed), do's & don't's" (in Profession).

- may be styled as the art of self government (regulations).
  ↳ self control
  self descipline
- Ethics comes into play when no one is watching you.
- The min. standards of conduct derieved from the Philosophical.
- Ethics is concerned about what is right, Fair about what we ought to do.
  ↳ (Dynamic / contextual).
- branch of Philosophy (+ Engg.) which seeks time to adress Concept of right & wrong (in Engg.).
- branch of Philosophy that is Concerned with Human Conduct (as Human, Society citizen).
- an attempt to help humans in leading good life by applying moral Principles.

Sources of Ethics / Morals

- God & religion
- Human Conscience.
- the example of good Human beings (role models).
- Political Power (Laws made by State / Govt.)
- Professional Associations (NSPE etc.)
  ↓
  National Society of Professional Engineers

Meaning of Law & Ethics

- By law, we generally mean legislation & statutes made by the govt. on a host (Number) of subjects for the Public good & Public welfare.
- Law = legal & Illegal (It is about following established law).
- In contrast, ethics refer to stds. of ethical Judgment & Conduct (in Engg.).

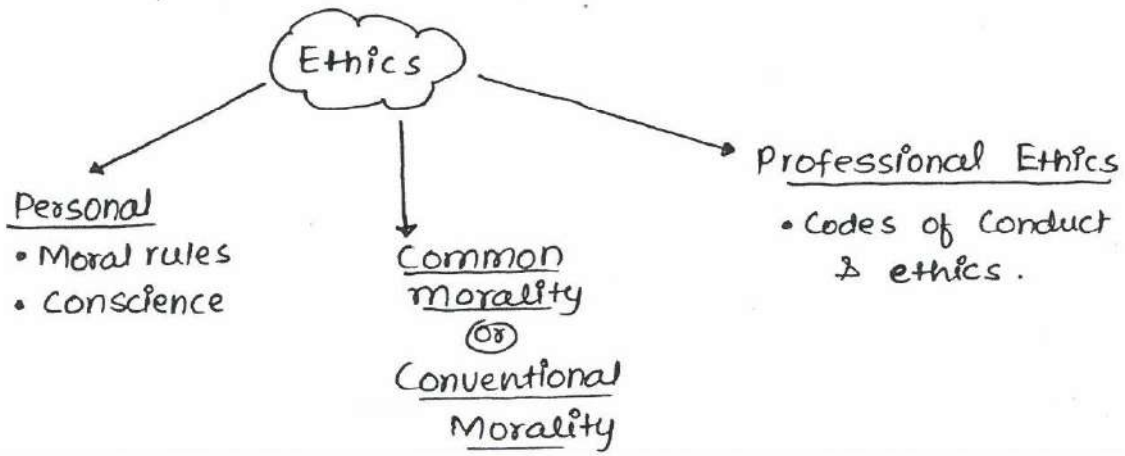
Difference blw Law & Ethics

- The law deals with legal & Illegal, while the language of ethics is about right, wrong, good & evil.

Religion & Ethics

- Religion = Followers ; Ethics = Secular.
- Religious ethics is based on Faith, while ethics is critical thinking.
- when religion makes use of divine Authority, while ethics use reason.
- Faith : In context of religion, it refers to a trusting belief in a supreme divine being.

Aspect	Ethics	Religion
* Source	Human reasoning, Philosophy Professional Codes	Divine authority, Scriptures, religious leaders.
* Basis	Rational thoughts, Values, duty, Consequences	Faith, beliefs, Spiritual teachings.
Applicable	to specific Professions	Specific to followers of a particular faith
Enforcement	Professional Bodies/ department	Religious community, Personal faith.



Personal Morals
↳ (Rules have Boundaries).

- Help your family (Nepotism)
- help your group (Favouritism)
- return Favours
- be upright (say No)
- defer to Superiors (respecting elders)
- divide (share) resources fairly.
- respect Other's Property.

Customary / Conventional Morality

- Norms/Customs that are passed on from one generatio to another (Ostracism)
  → through you out of Community.

Professional Ethics

- Set of standards adopted by Professionals.
- focus on issues that are important for & in that Profession.
- regulates professional relationship.
- moral obligations of a Professional.

What is Profession?

Features

1) Advance expertise : Skills, Knowledge, continuous learning.
   → Knowledge is no gurantee of expertise.
   Knowledge → How to apply known as

2) Self regulation : Stands of Conducts (Code of Conduct)

3) Public good : Serving Public good.

4) Way of making a living (livelihood).

5) Enter Voluntarily & leave Voluntarily (by choice).

6) Being ethical involves
   ↓
   Being ethically literate (What is right or wrong)
   ↓
   Being ethically Competant (skills).

Ethical Skills (abilities) / Competencies

Ethical Literacy

- Moral reflection : ability to foresee the CONSEQUENCES OF ONE'S ACTIONS.
- Moral motivation : motivated to act & respond ethically. (whistleblower).
- Moral character : having the strength & Perseverance to act morally.

Ethical Skills (abilities) / Competencies

- Ability to apply ethical Principles.
- As a citizen, respecting & Promoting Constitutional Principle of equality, fairness etc.
- As a citizen, proactively Respecting & Serving (follow) (Law) the public law.
- As a Professional, ability to respect, protect & not missused Privileged Information (confidentiality/secrecy).
  - Insider Trading.
- Ability to embrace & Promote ethical behaviour.
- Refuse to do Something unethical (Ability to Say No).
- Maintain truthfulness & honesty (Speaking the truth Vs Saying the right things)
  - presenting things in good way.

Common Ethical Principle guiding Human Actions
(Universal)

1) Honesty

- Honesty is duty to be NONDECEPTIVE (cheating Behaviour).
- Practice Honesty implies being Non-deceptive i.e. not indulding in cheating behaviours ——
  - a) Lying intentionally misleading Others.
  - b) Half-Truth deleberatly ommitting critical infor^{n}.
  - c) Cheating violating rules, not indulging in fair play.

- Practice (Professional) Honesty implies ——
  - Truthfulness: The reliable disposition (tendency) to tell the truth
    (Communicating factually correct infor^{n}).
  - Being Respectfull of others (Intellectual) Property: The reliable disposition to respect the property of others.
  - Proper Compilance: The reliable disposition to follow Fair and appropriate rules (Honest citizen).

- Honesty Vs National Interest

2) Doing NO Harm

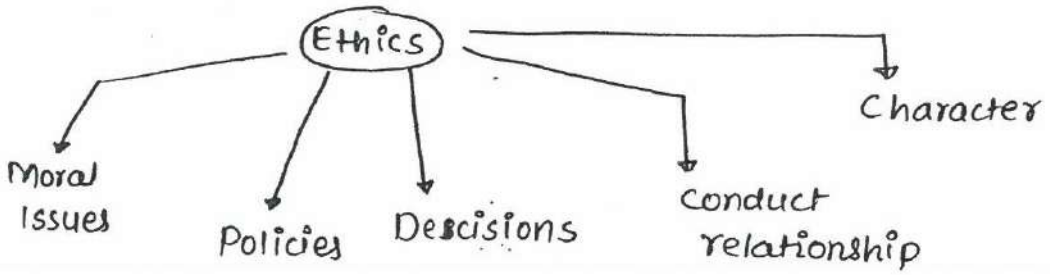
- Avoiding doing things that harm other people ——
  - Accidentally (Intention to hurt is missing).
  - Recklessly (endangering others live).
    - endangering: Can't put at risk some bodey else.
- Requires us to avoiding harming others in direct (or) Indirect ways.
  - direct → Physical
  - Indirect ways →
    - Verbals
    - Financials (Bribe)
    - Emotional.

3) Fidelity (Loyality, Dedication)

- you should fulfil your COMMITMENTS (aggrements, Contracts, Promises, Oaths etc.)
- you should ACT FAITHFULLY in relationship.

What is Engineering Ethics?

- Alc to Martin & Schinzinger, engg. ethics relates to the study of the —
  - moral issues & decisions confronting individuals & Organisations involved in Engg.
  - the study of related questions about moral conduct, Character, Policies & relationship of people & Corporations involved in technological Activity.



Core Components of Engg. ethics

1) Moral issue in Engg. Practice –

- Safety (1), Risk (2), Professional responsibility (3), Whistleblowing (4) & fairness in design (5).
- These are not just technical issues they require moral understanding & Judgment.

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- Awards & Honours
- Books & Authors
- sports
- Indices
- Miscellaneous
  - Imp. Personality
  - Imp. Date
  - Imp. Place

- Economic related current development :

→ Types of Economic Activities

Any kind of Economic transaction in exchange of goods and services is considered as economic activity. There are four type —

1. Primary
2. Secondary
3. Tertiary
4. Quaternary

1. In Primary activity the product is obtained directly from nature. For example : Agricultural product
   fisheries horticulture
   Bee keeping cereculture
   Mining fossil fuel etc.

2. It includes manufacturing activity such as conversion of iron into automobile, conversion of wheat into breadslice. transmission of electricity.

3. Services sector, Teaching, Banking, Medical, Engineering Massage,

4. This sector includes skill development, knowledge gain, getting higher degree, R&D (Research & Development)

→ Contribution of tertiary sector in GDP is higest and in 2025 it is around 55%

→ Contribution of secondary sector in GDP is 27%

→ Contribution of Primary sector in GDP is 18%

To boostup the contibution of secondary sector GOI has launched following program ——

1. Make in India Project.

It aims to promote manufacturing in India by giving Incentive to the producers.

2. Pradhanmantri Employment Generation Programme

It is an incentive program on the no. of employment Generated.

3. Mudra Yojna (MUDRA YOJNA)

MUDRA YOJNA is about providing loan to micro industries.

MUDRA - Micro Units Development & Refinance Agency

Three type of loan —

① Shishu - तैयारी, शुरुआत (loan upto 50,000)

② Kishor - 50,000 - 5 Lakh

③ Tarun - 5L - 10L

④ Tarun Plus → 10L - 20L (newly added in 2027)

↳ This is a collateral free load

4 VISWAKARMA Yojna: artist, painter, traditional work

collateral free loan with subsidised interest is given to artisians who are involved in traditional works of manufacturing

Schemes Related to Quaternary sector:

1. PM Internship scheme (Pradhan Mantri) (october 2027)

Under internship scheme GOI is providing internship to students (Target - Internship to 1crore student in 5 year). Montly stipend of ₹5000/- per month is given. (₹4500/- from Government & ₹500/- by companies)

→ Age limit → (21 to 24) year

→ Education requirment - min^m 10th

→ Graduates from foremost Institute of India (IIT, IIM) not allowed

→ Graduate with professional qualifications cannot apply

After the completion of internship they may be absorbed by the companies.

2. NSDM (National Skill Development Mission)

→ The target is to provide skill for skil development to one crore youth, so as to make them employable

3. RDI Program (Research Development & Innovation Progra.

NOV. 2025

→ Budget - 1 lakh crores for promotion of Indias Research and Development (R&D)

→ Its aim is to bring India at the third position globally in PHD (Docter of Philos—)

→ To Boost up R&D in cutting edge modern technology in the feild of space, biotechnology, quantum computers super computers, artificial intelligence and in semiconducte.

National income of India:

There are three methods to calculate national Income

1. Product Method: It is based on the total value of product produced in a given financial year.
2. Income Method: It is based on the total income in India from all the Sources
3. Expenditure Method: It calculate the total Expenditure in a given financial year.

Terms related:

GDP: Gross Domestic Product or, Expenditure

It includes all the types of income Generated in India within the Boundary of the country.

Remitance
Prabasi Bharatiya Diwas

2. GNP (Gross National Product):

This is the income generated by the nationals of a ~~country~~ country

GNP = GDP + Income from Abroad

→ Based on Nominal GDP India has become the fourth largest economy of the world

USA → 30 trillion $
China → 18 trillion $
Germany → 4.7 trillion $
India → 4.2 " "
Japan → 4.2 " "

→ If Indian rupee looses against dollar then GDP falls

→ If value of currency decrease w.r.t dollar then export increases

→ when central bank of any country decrease its value of currency w.r.t $ it is called as devaluation

→ When the value of currency falls automatically w.r.t dollar then it is called as depreciation

Purchasing Power Parity:

In terms of purchasing power Parity Indias GDP is approximatly 17 trillion dollar, that makes India 3rd largest Economy of the world after USA & China

05/01/2020

→ India registered as its real GDP growth at 8.2% in 2025 Q_2 financial year [Q_2 → Quater 2]

→ According to GOI this growth is registered because of its increase in its private consumption and increase in the manufacturing sector. But, according to IMF (International monetary fund) the growth of Indian economy appears. due to its own base year 2011. But GOI has announced to change its base year in 2026 to 2023.

→ **Gross - Depreciation = Net**

Gross Domestic Product - Depreciation = Net Domestic Product

GDP - Depreciation = NDP — Real GDP

GNP - Depreciation = NNP → Net National Product

Gross National Product

Market Price & factor Cost:

→ factor cost / factory price: This is the manufacturing cost of the product just out of the factory. It does not include any govt. taxes. factor cost include raw material cost, rent, wages, interest on loan, any transporation charge and any other charges.

→ Market Price: It include factor cost with govt. taxes.

↳ factor cost + Govt. Taxes.

India calculate its National Income for stastical purposes based on NNP at Market Price. It was changed in 2015 Before 2015 National Income was calculated on the basis of NNP at factor cost because earlier it was difficult to calculate taxes in the absence of GST.

① Giffen Goods: If the prices increase, consumption of such goods are not affected or even if the price decrease consumption remain same.

② Veblen Goods: These goods are consumed more if it is costly.

Example: Paintings, Gold, Luxuary Cars, costly watches

→ If in a economy consumption of veblen Goods increases then it indicate rising GDP.
→ Govt. also imposes higher takes rates on Veblen Goods.

Tax Reform:

Tax structure

Direct taxes

Eg: Income Tax

→ This type of tax is applicable on those only on whom tax libility is applicable

Eg: - Income tax
- Corporate tax
- Custum duty
- challan

Indirect Taxes

Eg: GST

→ This type of take can be transfered to a third party and therefore tax liability can be shifted.

Eg: GST (Goods & service Tax)

GST: (Goods & Servic tax)

GST is consumption based indirect tax. GST is not applicable on every stage of production.

→ Types of GST → ① CGST: Central GST
This GST is applicable for intrastate sell of Goods, but the GST is collected by Central Govt.

(2) SGST : State GST : This type of GST is also applicable for intrastate transfer of Goods, but the tax is collected by state Govt.

(3) IGST : Integrated GST : This is applicable for interstate transfer of Goods, but the tax is collected by central and state Govt. both.

(4) UTGST : Union Teritory : It is applicable for sale of goods within union teritory, but the tax is collected by the Union teritory.

→ Goods exempted from GST and VAT (value added Tax) is applicable for → Alcohol for drinking purpose
→ Petroleum Products : Petrol Diesel

→ GST council : GST council is the apex body to decide about the GST rates on different types of Goods & services. GST council consist of a chairperson Nirmala sitaraman and minister of finance state as Deputy chairperson and finance minister of states as GST council members. GST Decision are taken by GST council by majority votes.

→ GST Reform : Now GST has become two slab structure of 5% & 18%

→ 12% & 28% GST is removed.
→ Majority of items fall under 5% GST → Medicines
↳ Cotton goods
Daily use items
→ 18% GST → Building Material → Cement, services
→ 40% GST → Sin Goods → Tobacco products
→ Aerated Drinks
→ Luxury Goods (Veblen Goods)

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INFORMATION & COMMUNICATION TECH (ICT)

→ Application of ICT Tools (1) in the field of e-governance (2), e-education (3) and Networking (4).

• ICT → INFormation & communication Tech.
↓
Mobile communication –(5)

* ICT syllabus (10–11 ques.)
1. ICT Tools → (1–2) → (100%)
2. Networking .*** → (4–5) → (50%.)
3. e-Governance → (2–3) → Easy (100%. Prob.)
4. e-Education. → (1–2) → (100%)
5. communication. → (1) → (100%.)

• current AFFairs.
↳ (15–20 ques.)

* e-Governance : →
(i) What is e-Governance.
(ii) objective. / Advantages - Disadvantages.
(iii) National e-Governane programme. (NeGP)
(iv) NeGP 1.0 / 2.0
(v) Digital India programme.
(vi) e-Gov related programme / policy.

* What is e-Governance.

→

• Governance:

: processes taken by the goverment that brings max^m welfare for the max^m no. of people.

→ e-Governance means electronic form of governance.

→ In e-Governance, Governance is based on electronic platform such as internet, mobile communication, Telephone.

→ e-Governance was started in india in year 2000 with the launch of IT-Act. (Information technonology Act.)

→ with this Act, A ministry MoICT was established. (MoICT → Ministry of Information and communication technology).

→ Later on, MoICT was changed into MeITY (Ministry of electronic & Information Technology), in 2014.

* IT Act-2000:

→ Any aggreement on electronic / digital media is recognised in the court of law in india.

• conclusion:

→ It was a weak law. It did not talk about e-commerce, social media etc.

→ In 2008, section 66(A) was added in IT Act, 2000.

→ In year 2017, supreme court abolished (A) of section 66 on the basis of voilation of Fundamental right i.e Right to Freedom of Speech and expression.

* Data privacy and Data protection Bill :

1. Dr. Srikrishna committee recommendation:

(i) Data localisation :

: Data has to be maintained in local data centre within the boundry of india. so the IT Act can be applied on them.

(ii) An institution will be formed by the govt to monitor any unwanted / threat data & such type of data can be removed from the data centre only.

NOTE: SC did not allow it on the basis that it is ~~*~~ in voilation of Fundamental right of 'Right to privacy.'

(iii) Data ~~ower~~ ownership :

→ Data owership lies with the creator of data.

NOTE: ~~For~~ From these (i) & (iii) recommendation v has beer been adopted by the govt. and it is extended to OTT platform also.

over the ~~top~~ top.

Later on, it was extended to the conte not suitable for children that may be related to pornographic content or voilan then it must be made restricted for children below 18 years of age. Also, the website will make sure that if any such content is available then the viewer is above the 18 years of age.

→ under IT Act, doxing has also been addressed. Doxing means hacking another person identity and posting content through this identity.

→ Doxing also means tracking other persons activity on internet and social media.

→ The process of removing, identifying and correcting any doxing activity or any other defect in computer is called as debugging.

→ The digital content is also made valid in a court of law as a proof in india.

never completly achievable ← Long term Goal

objectives of e-Governance:

(i) e-Gov objective is to bring empowerment for the people through information.

(ii) people should participate in governance. (people's participation).

(iii) e-Gov. brings responsibility and accountability, making the goverment responsible.

(iv) e-Gov. makes people and govt. interaction easy and more frequent. Therefore, it brings responsibility & accountability in governance.

(v) To reduce cost and time delay of a project.
It can be reduced by using ICT Tools for communication.

(v) It brings transparency.

Ex-(a) RTI Act. (Right to information Act), 2005.

(b) mygov.in : website or App to communicate with the govt. directly. It is possible to connects with primeminister's 'man ki Baat' programme through this.

(c) opendata.gov.in : All data collected by the govt. are made available on this platform and it is possible to access these data free of cost at any time.

NOTE: A transprent governance is a part of good governance because transparency bring trust between the govt. and the citizen.

(vi) e-Goverance is a tool to achieve good governance. →

(vii) e-Governance can reduce corruption by bringing faceless governance.

Ex: (a) mca-21 (Ministry of corporate Affairs-21
: It is a faceless corporate registratio in india. so, as to remove corrupt paractices in corporate registration

* Advantages & Disadvantages of e-govern -ance :

Advantages:

(i) e-Gov. is a paperless gov. Therefore it is environment friendly.

Ex: Nagaland has become the First vidhan sabha in india which is completly paperles UAE has becomes the st goverment in the world to go paperless governance.

(ii) Information tech. brings the information at a Faster speed. Therefore it increases the rate of developement & empowerment

(iii) The projects can be completed in a given time. Therefore, monitoring and serveying of project becomes easier using ICT.

Disadvantages

(i) Digital literacy : India has large digitally illitirate population. To improve digital literacy, two pragramme are started by the govt →

(a) NDLM — (National digital literacy mission).
: under this programme, the target is to provide digital literacy to 6 crore household.

(b) PMGDISHA (pradhan mantry gramin digital Sakshatta mission).
→ under this program, the target is to provide digital literacy to 6 crore household particularly in rural area.

(ii) content availability in English only.

22 schedule language.

↳ +1 = 23

↳ santhali → oldest lang. in world.

↳ Chota Nagpur → (JH, M.P)

↳ Gondwana land → oldest land of world.

- No National language in india.

→ India has started developing the content in their regional language also.

- Rajasthan becomes the 1st state in india to develope its content in its regional language (Hindi) also.

(iii) The initial setup cost for infrastructure is very high.

(iv) privacy problem:

: Data privacy and data security is always compromised in digital governance.

→ To remove the privacy problem, steps taken by the govt are →

(a) e-aadhar or digital aadhar.

: For online transaction, 16 digit aadhar No. is created in place of the 12 digit aadhar No. From which only 4 information can be obtained.

- Name
- Address.
- Phone No.
- DOB.

(b) Launch of digital data protection bill.

: The bill is about the protection of digital data, stop or reduce data leakage & also to avoid digital transactions of unwanted and socially immoral data.

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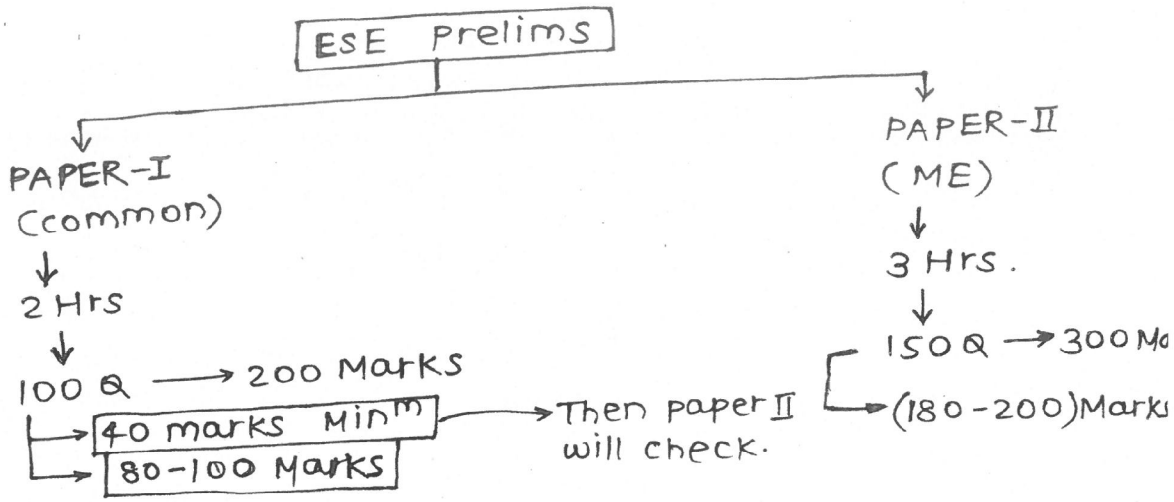


* Syllabus :

1. Introduction & Atomic Bonding.
2. crystallography. - ME
3. Electric properties of material.
   - conductor.
   - Insulator
   - semi-conductor.
4. Magnetic properties of material.
5. Mech. properties of material. - ME
6. ceramic.
7. polymer.
8. composites.
9. phase diagram & Alloys. - ME

- Source of study

1. class Notes
2. Theory Book.

Practice

- Que. From theory book
- PYQ

- Telegram

Anunaad 22 ..... Lets be in Resonance.

* Material science :→

→ Mat. science involves investigating the relationship b/w the structure and properties of materials.

→ Mat. sci. does not deal with study of strength & stiffness (or other properties) behaviour of engg. components such as buildings, machines, automobile et-c., rather it deals with the study of strength & stiffness, behaviour (or other properties) of the material with which these engg. components has been designed

Material :→

→: Material can be defined as something that consist of matter. (occupies some space and has some mass).

→ It is the stuff by which something can be made.

→ Engg. material can be broadly classified as-

1. Metals & Alloys.
2. ceramics → (Ex: Bricks, Tiles, Stones et-c)
3. Polymers.
4. composites.
5. Advanced Materials. → smart Materials. / → semi-conductors. / → Bio Materials. / → Nano materials.

Structure :

: Structure of a material usually referres to the arrangement of its internal components.

(a) subatomic structure.

(b) Atomic structure. → Nuclear structure → • Nuclear magnetic Resonance (NMR) / • Massbauer studies.

(c) Nano structure.

(d) Micro structure → The structure which can be observed with the help of an optical microscope

(e) Macro structure → The structure which can be observed with naked eyes.

Properties OF Materials :→

→ A property is a material trait in terms of the kind and magnitude of response to a specific imposed stimolous (excitation).

→ Generally, definitions of properties are made independent of material shape & size.

- Mechanical properties.
- Electrical properties.
- Magnetic properties.
- Optical properties.
- Thermal properties.
- Deteriorative properties → Ex: corrosion, creep.

* SiO_2 (Molten) ← M.P = 1710C

  - slowly cool → Quartz (single crystal Material)
  - Rapidly cool → Glass (Amorphous material)
    - ↳ (cooling Rate higher than critical rate cooling)

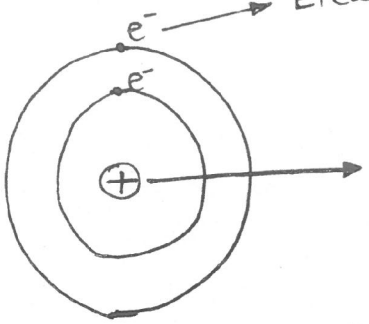
Processing → Structure → Property → Performance

Atomic Bonding :

Matter is made of some tiny indivisual structure known as atoms.

Atoms can neither be created nor destroyed.

- Greek word → tomio → cutable
  - A → Not
- Atom → a-tomio
  - ↳ Electrically Neutral.



Electron → { • Negatively charged particle
• charge = -1.6×10^{-19} C
• Mass = 9.1×10^{-31} kg.

Nucleus.

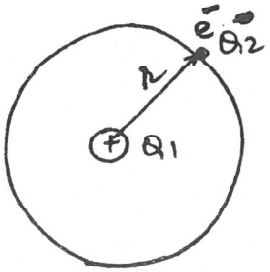
↓

It contains proton + Neutrons.

proton → { • positively charged particle
• charge = 1.6×10^{-19} C
• Mass = 1.67×10^{-27} kg

Neutrons → Electrically Neutral particle { • charge = 0
• Mass = 1.67×10^{-27} kg

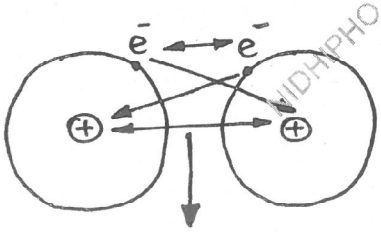
*



$$F = \frac{1}{4\pi\epsilon_0} \times \frac{Q_1 Q_2}{r^2}$$

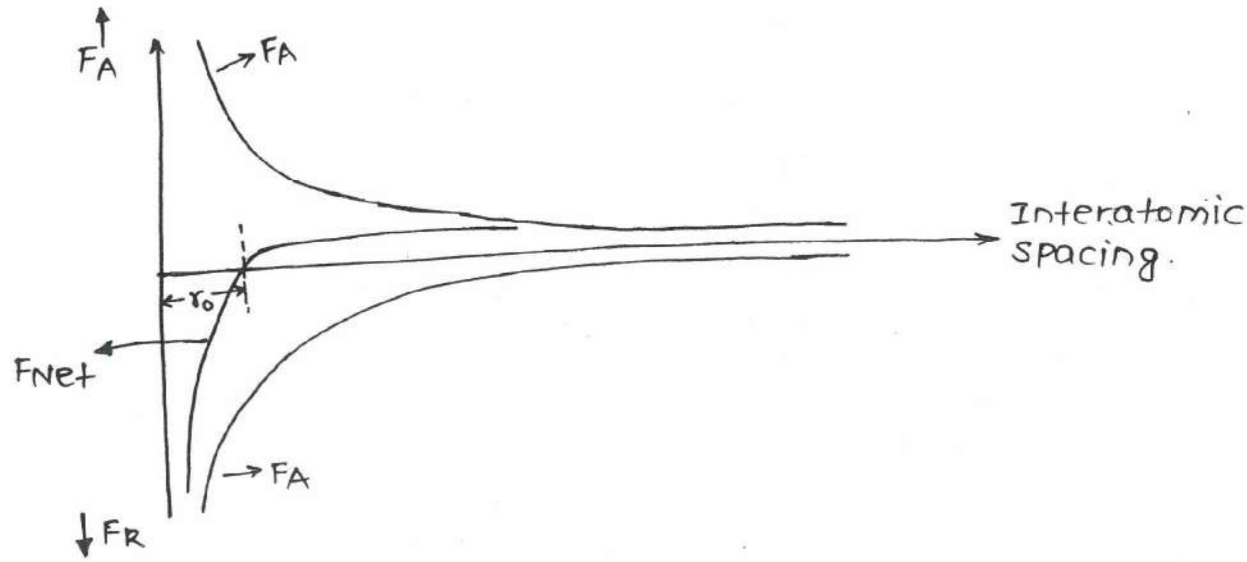
↳ Electrostatic Force. (coulombic Force)

- IF Q_1 & Q_2 same Nature → Attraction.
- IF Q_1 & Q_2 diFF. Nature → Repulsion.



→ $\boxed{F_{Net} = F_A + F_R}$

Equibrium interatomic spacing.



- **Chemical Bond :**

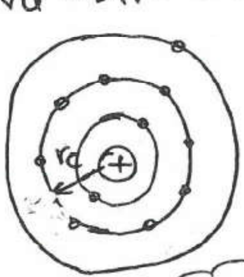
The binding force b/w atoms or molecule is known as chemical bond.

Chemical bond

- **Primary Bond**
  - Interatomic bond.
  - Electrostatic Force (coulombic Force)
  - Strong & Stable.
  - Types:
    - Ionic bond
    - covalent bond
    - Metallic bond.
- **Secondary bond**
  - Intermolecular bond.
  - Vanderwall's Force
  - Weak & unstable.

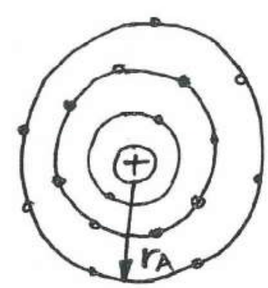
* Ionic Bond :

Na → 11 → 2, 8, 1



$r_c < r_A$

Cl → 17 → 2, 8, 7



I	II	III	IV	V	VI	VII	VIII
							He
H			C	N	O	F	Ne
Li	Be	B	Si	P	S	Cl	Ar
Na	Mg	Al	Ge	As	Se	Br	Kr
K	Ca	Ga					

Metallic Element (I–III)   Non-mettalic Element. (V–VII)

$Na \longrightarrow Na^+ + e^-$ (Na⁺ → cation)

$Cl + e^- \longrightarrow Cl^-$ (Cl^- → Anion)

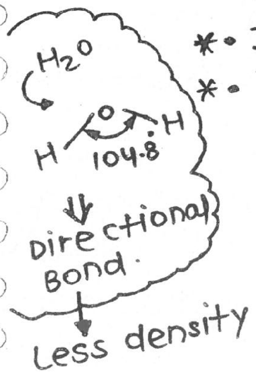
- cation are always smaller than anion.
- cation → one orbit loose.

$Na^+ + Cl^- \longrightarrow NaCl$ (NaCl → Ionic compound.)

Ionic bond is the electrostatic Force between cation & anion.

*• Ionic Bond → strongest Bond.

*• Hardness → surFace prop. → Resistance oF scartchi



*

(i) Ionic bonds are non-directional bond i.e the magnitude oF bond is equal in all dirn around an ion. It Follows that For ionic materials to be stable, all positive ions must have as nearest neighbours negatively charged ions in a 3-dim. scheme and vice-versa.

(ii) Ionic bonds are generally Formed b/w mettalic & Non mettalic elements. Metalic elements have tendency to easily give up their outer orbit electrons So these Form cation.

(iii) Non Mettalic elements have tendency to take electtons so these Forms anions. So ionic bond is basically the coulombic Force b/w cation & anion. Hence it is the strongest among all primary bonds.

* properties of ionic bond :

(i) Ionic materials are inorganic material.

(ii) crystalline in Nature.

(iii) High strength & Hardness.
Low ductility & malleability
↓ To draw in wire ↓ To draw into sheet.

(iv) High brittleness.

(v) Electrically & thermally insulator. → B/C NO Free electron

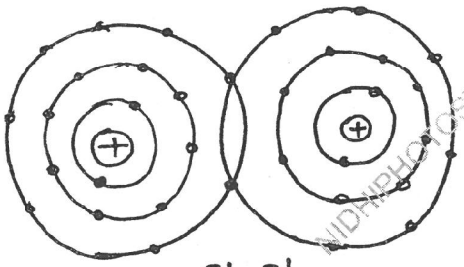
(vi) Bonding energy is which generally range b/w 600 - 1500 KJ/mol are relatively larger hence high melting tempr.

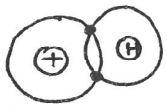
(vii) Non directional bond.
↳ Dense compound Forms.

* covalent Bond :

Cl ⟶ 17 ⟶ 2,8,7

→ Formed by sharing of electrons among the atoms.





→ Less density

- covalent bonds are directional bond. & It is between specific atoms and may exist only in the direction b/w one atom and another that participates in electron sharing.
- covalent bonds are weaker than ionic bond but very stronger than vanderwall Force.
- Metalic element not forming co-valent bond b/c there is deficiency of electron in their outer most orbit.

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Project Management

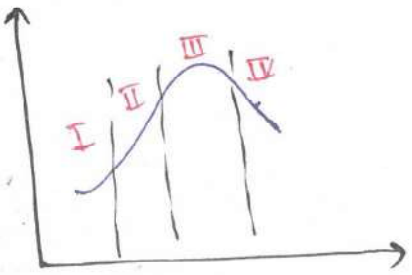
Lect-1
19/11/2025

→ Project – "unique" and "temporary" (end in certain time) endeavor to provide service, product etc.

- Two project can not be identical.
- Project is not continious (temporary)
- Project starts and end.

→ operation – unending.
Identical.

→ Project life cycle



I – Feasibility phase
II – planning phase
III – Execution phase
IV – Termination phase

max efforts – Execution phase.
min efforsts – Termination or commissioning phase.

→ feasibility –

- Legally feasible.
- financially feasible.
- Technically feasible.
- nature feasible.

→ Planning phase – In this phase :–
Project sponsor (owner) hires a project manager before entering into the process of planning.

∵ PM has prior experience so planning must be done by Project manager (PM).

* PM is hired in the planning phase ✗
→ PM is hired before entering the planning phase.

- what is the procers of hiring?

Project sponsor drafts a "project charter."

In project charter - roles and responsibilities of PM are mentioned.

project charter is an "official document" that authories PM to use all resources of the company required to excute the project.

If there is no project charter that means NO PM is hired.

In planning phase—

what are the inputs?

Macro
1. Project life cycle

nicro
1.1 Plan
1.2
1.3

Budget start
Actual
closing.
Turn around time.
Responsibility

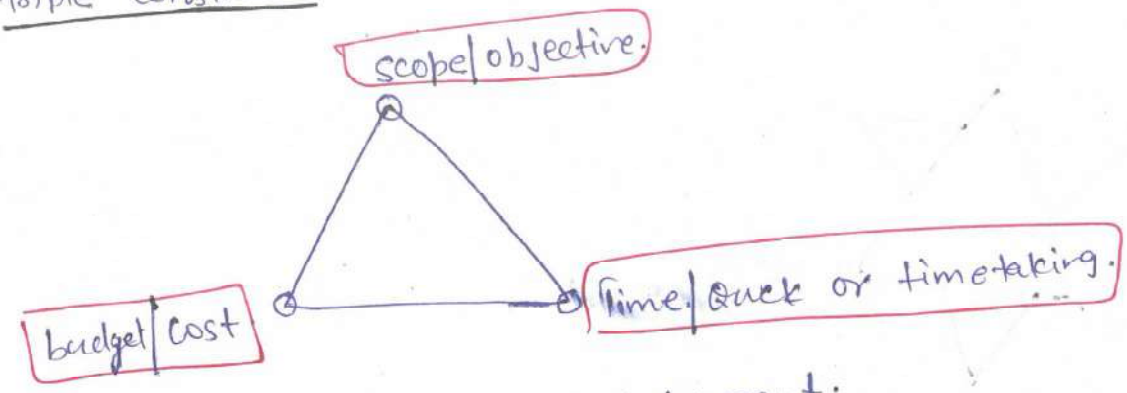
macro	micro	BGTST	ACTST	BGTCL	ACTCL	TAT	Res.	Aging
1. Project life cycle.	1.1 Planing	5 April	5 April	10 April	10 April	5 day	A	0
	1.2 executing	10 April	10 April	30 April	2-may.	2 day.	B	2
	1.3 Termination.	30 April	2 may	3-may	5 may.	3 day.	C	2

* micro planning is very important

* Project manager chalks out the plan and then aligns the team member for its execution.

Project Constraints

① Triple constraint.

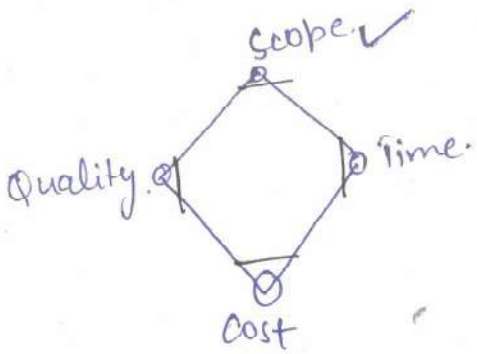


Define scope – – Healthy food Restaurant.
– Zero maida policy
– No suger policy.
– No deep fry policy.
– for student studying in coaching institute.

Time –: How Quick the service can be provided.

cost :- How economic | pocket friendy (or) expensive ☹

② Dimand constraint ← only two constraints can be controlled. if Given scope is defined.

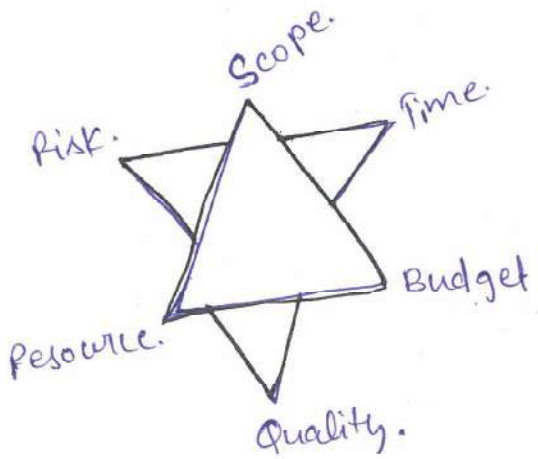


scope – fix ✓

Time	Cost	Quality.
Quick	High.	High.
Quick	low	low
Time ↑	low	High.

③ strar constraint –:

Star constraint -:

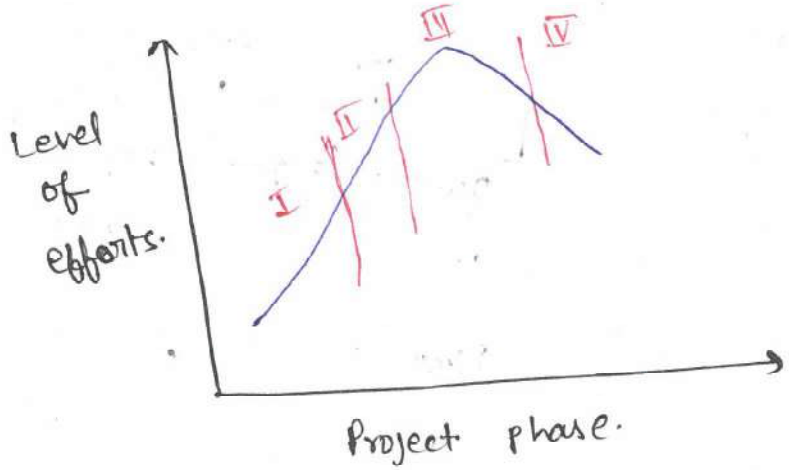


Resource -

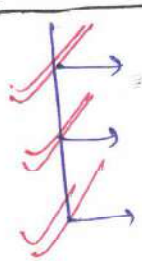
- manpower
- money
- machine.
- material.
- Data.
- Technology.

Risk -:

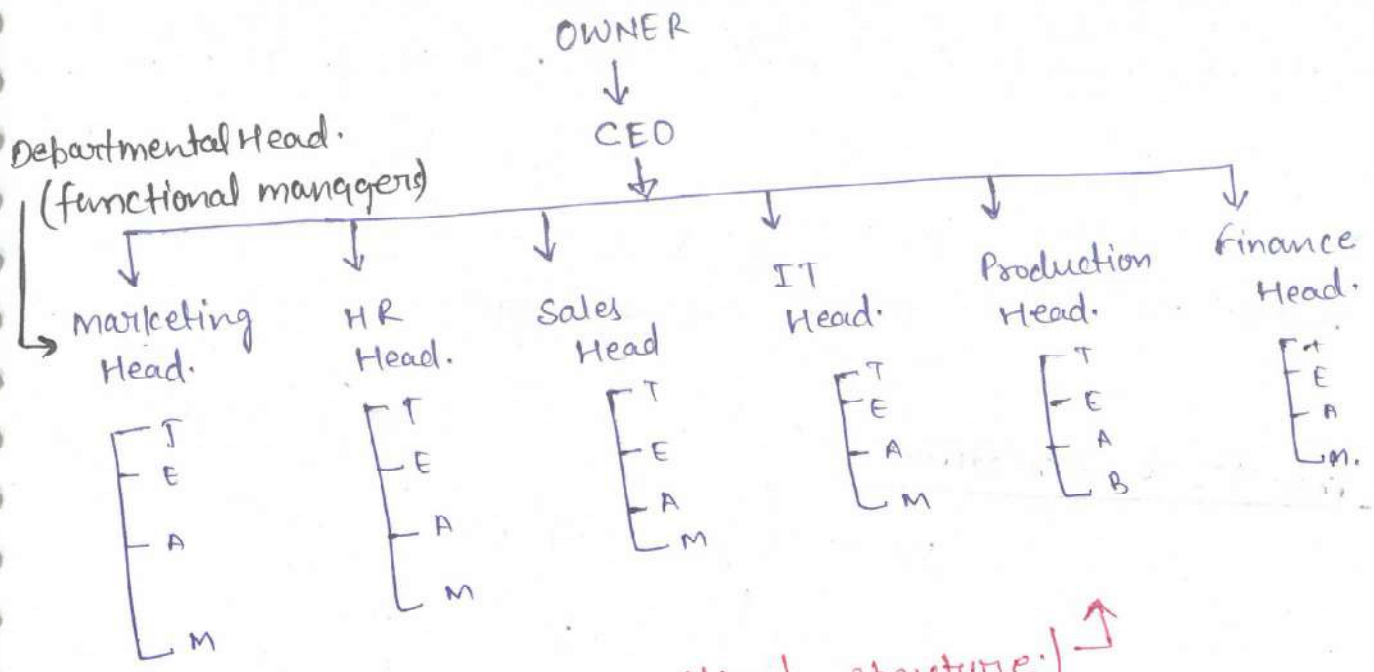
- Technical failure.
- Product rejection.
- Quality deficit.
- Loss of Money (Negative profit)



— Project organization structure —



- functional org. str.
- Projectized org str.
- matrix org str.



↑ (functional orgnagaidional structure.)

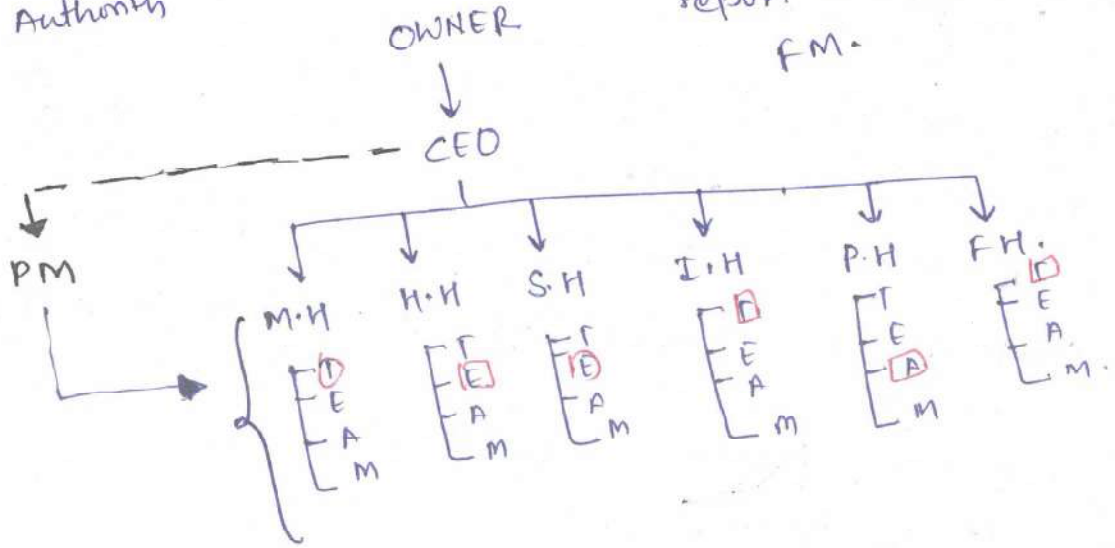
Project manager does not have high authority.

FM A > PM Authority.

(functional manger) Authority

(Project manger)

→ Team members directly report to their respective FM.

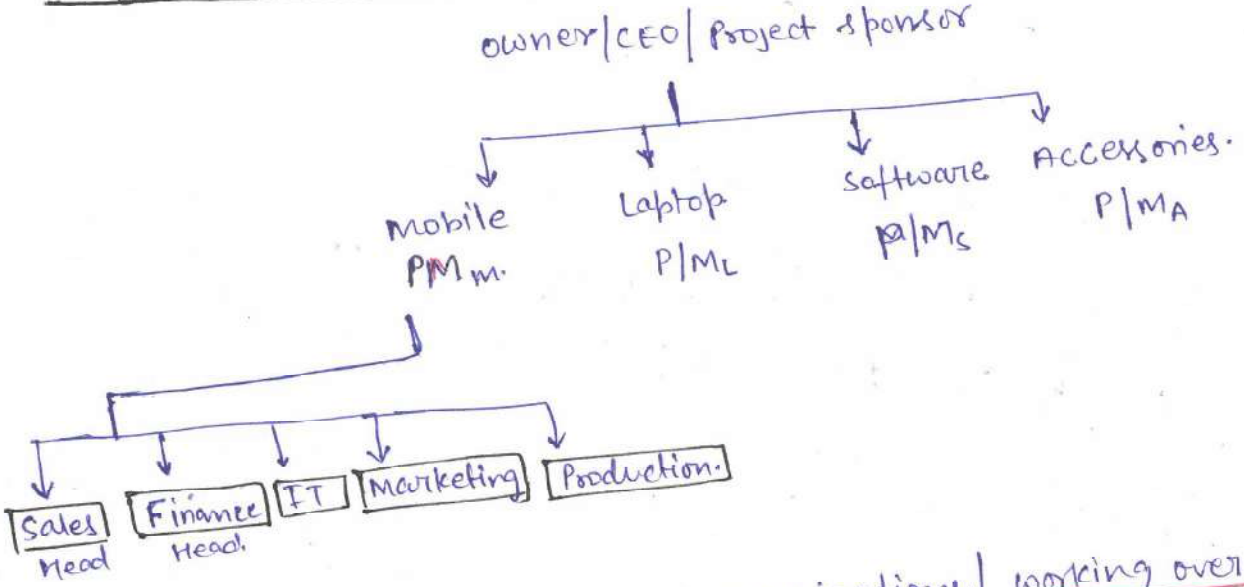


function org. str:

- It is for small companies.
- major rights lie with owner.
- owner involves in daily activities.
- since FM & PM does not have high authority, they can not be held responsible for project failure.

- It is difficult to identify non performing Assets.
- Team members have light response for PM.
- For companies working in small territory.
- customer addressal system is weak.

Projectized structure -



→ This structure is for large organizations. working over large territory.
→ PM has high authority.
→ Dedicated manpower for specific product.
→ Company owner does not interevene into day in/day out activity.
→ PM takes complete responsibility.
→ customer orddressal is strong.
→ ~~NPA~~ Non performing assets can be easaly identify.
→ manpower/resources sharing is not allowd.
→ It is an expensive structure → multiplion of Heirarchy.
→ since project manager high authority.
∴ Team members responds pro-actively to PM.

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- Maintenance
- sampling
- Quality
- Quality control control
- process capability
- TQM
- Six sigma
- Quality in service sector.
- ISO
- LPP
- Inventory
- Line balancing

* Maintenance *

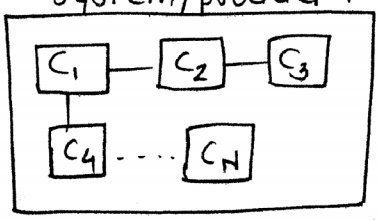
Reliability :- The Reliability of product or system can be defined as the probability that the product will perform it's require function under the specific condition for the certain period of time

R = function (time) $R = f(t)$

$t = 0 \rightarrow R = 100\%$

$t\uparrow = R\downarrow$

system/product.

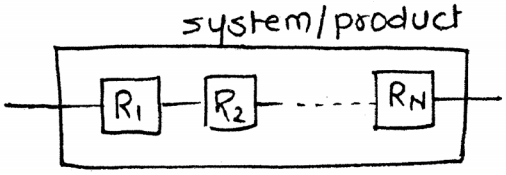


C = component

Reliability of system will depend on Reliability of individual component.

For series connection

system/product



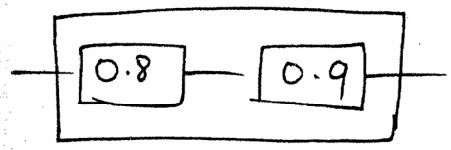
$R_S = R_1 \times R_2 \times \ldots\ldots R_N$

R_S = Reliability of system

R_1 = Reliability of component ①

R_2 = Reliabi ②

Assume that a product has two component both of which must work for the product to fun^{n}. comp. ① has reliability of 80% and comp ② has reliability of 90% - compute the reliability of the system.



$R_S = R_1 \times R_2$

$= 0.8 \times 0.9$

$= 0.72$

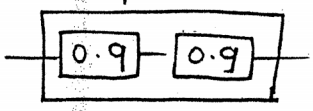
$= 72\%$

S-1 The reliability of the system is alwz less than or equal to the reliability of individual component when they are connected in series.

$$R_S \leq \{R_1, R_2 \ldots R_N\}$$

Ex. compute the Reliability of the system.

system-1

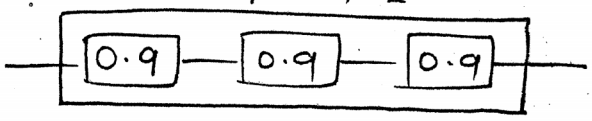


$R_S = R_1 \times R_2$

0.9×0.9

$= 0.81 \quad = 81\%$

system-2



$R_S = 0.9 \times 0.9 \times 0.9$

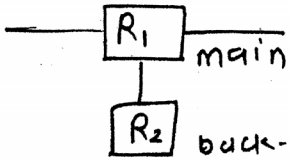
$= 0.729 \quad 72.9\%$

S-2 As the number of component in the series increases the reliability of system decreases.

How to increase the reliability of system.?

by providing backup to the critical component.

* parallel connection.



$R_S = R_1 + R_2(1 - R_1)$

$R_S = R_1 + R_2 - R_1R_2$

Two power generator provide electricity to a facility i,e main & backup generator the main Gen. has reliability of 0.95 and backup has reliability of 0.90 compute the Reliability of system.

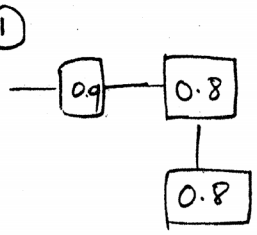
$$R_S = R_1 + R_2(1-R_1) = 0.95 + 0.90(1-0.95)$$

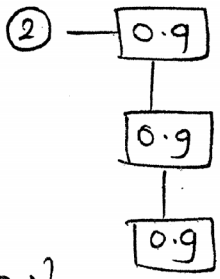
$$\boxed{R_S = 0.995} \qquad \boxed{99.5}$$

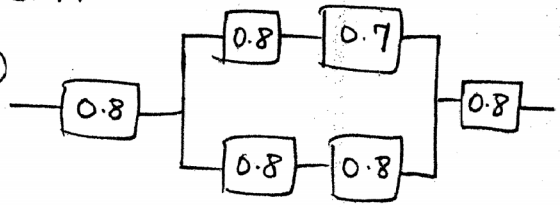
S-3 : The Reliability of the system is always greater than the Reliability of individual component when they are connected in parallel connection.

S-4 As the no. of component in backup (parallal) increases the reliability of the system is Increase.

Compute the Reliability of system.

① 

② 

③ 

① $R_S = R_1 \times \{R_2 + R_3(1-R_2)\}$

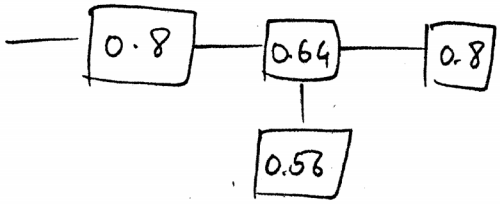
$0.9 \times \{0.8 + 0.8(1-0.8)\}$

$R_S = 0.864$

② $R_S = R_1 + R_2(1-R_1) + R_3(1-R_1)(1-R_2)$

$= 0.9 + 0.9(1-0.9) + 0.9(1-0.9)(1-0.9)$

$R_S = 99.9$

③ 

$R_S = 0.8 \times \{0.64 + 0.56(1-0.64)\} 0.8$

$= 53.86\ \%$

* Reliability prediction using exponential distribution.

It is one of the most commonly used distribution in the reliability prediction and it used to predict the probability of survival to a particular time.

$$R(t) = e^{-\lambda t}$$

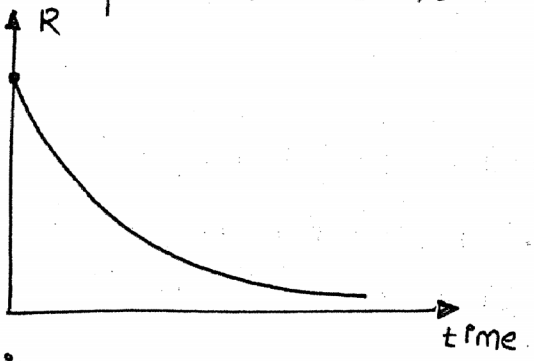
at $t = 0$ $R = 100$

$t \uparrow$ $R \downarrow$

$$R(t) = e^{-\lambda t}$$

R = Reliability

t = time



λ = failure rate.

Exponential Distribution. failure rate remain constant wrt time.

Weibull Distribution. failure rate increases/decreases wrt time.

For λ.

① MTTF → Mean Time to failure

② MTBF → Mean Time ~~to~~ Between failure

③ MTTR → Mean Time To Repair.

① MTTF

→ it is refered as average time an item may be expected to function before the failure.

→ it used for non-repairable item

Eg. Bulb — 4 → 3000, 4000, 4000, 5000

$$MTTF = \frac{3000+4000+4000+5000}{4}$$

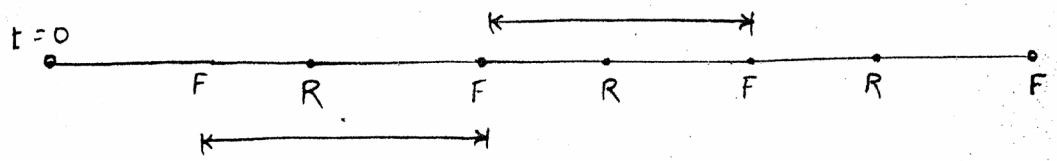
$$MTTF = 4000 \text{ hr}$$

② MTBF

→ It refers to time between two failures.

→ It used for repairable items

$$MTBF = \frac{\text{Total Device hour}}{\text{no. of repair}}$$



Total device hour = 20000 hr

no. of repair = 4

$$MTBF = \frac{20,000}{4} = 5000 \text{ Hr}.$$

MTTR.

$$MTTR = \frac{t_1 + t_2 + \cdots + t_i + \cdots + t_n}{n}$$

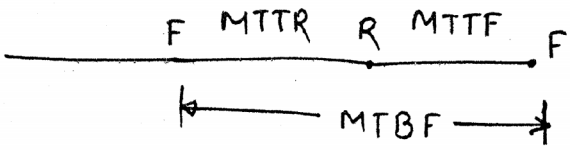
Q.

a) MTBF = MTTF - MTTR

b) MTBF = MTTF + MTTR

c) MTBF = MTTF × MTTR

d) MTTF = MTBF × MTTR



MTBF = MTTF + MTTR MTTR = 0

MTBF = MTTF.

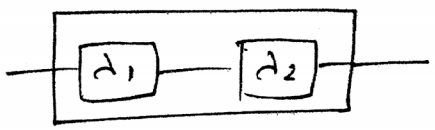
NOTE: MTBF can be used for both repairable as well as non-repairable item.

For λ.

$$\lambda = \frac{1}{MTTF}$$ For non-repairable item $$R(t) = e^{-\frac{1}{MTTF}t}.$$

$$\lambda = \frac{1}{MTBF}$$ for repairable item $$R(t) = e^{-\frac{1}{MTBF}t}$$

Ex.



$R_1 = e^{-\lambda_1 t}$ $R_2 = e^{-\lambda_2 t}$

$R_S = R_1 R_2$

$= e^{-\lambda_1 t} \times e^{-\lambda_2 t}$

$R_S = e^{-(\lambda_1 + \lambda_2)t}$.

Q. The Reliability of a repairable product by exp. disti. is given in hour as $R(t) = e^{-0.004t}$ and mean time to repair is 20 hour. The MTTF of the product in hour is ?

a) 250 b) 150 c) 270 d) 230

$$R(t) = e^{-0.004t} \qquad R(t) = e^{-\frac{1}{MTBF}t}$$

$$\frac{1}{MTBF} = 0.004 \quad MTBF = 250$$

$$MTBF = MTTF + MTTR \quad 250 = MTTF + 20$$

$$\boxed{MTTF = 230}$$

* Maintainbility :-

It is the probability that failed component or system will be restored to a spacific condition within a period of time when maintainance is performed according to prescribed procedure.

* Availability

It is the probability that a component or system is performing it's required function at a given point of time when it is used under the stated operating condition.

$$Availability = \frac{uptime}{uptime + Runtime}$$

$$A = \frac{MTBF}{MTBF + MTTR}$$