Civil Engg.

Unit-I

1. Structural Engg.
2. Geotechnical Engg.
3. Transportation Engg.
4. Hydraulics Engg. & Hydrology
5. Environmental Engg.
6. Construction Technology.

Environmental Engg.

Impact & Pollution

Environmental Engg.

- Air & Atmospheric systems → Source, Intensity, Movement, Effects
- Water
- Land
- Energy
- Sound

→ Air → NCR
- → High
- → Health conditions
- → Air movement

→ Water → India
- → Very high
- → Flow of water
- → Impure water, unfit for drinking

→ Land → India
- → High
- → Industrial mining
- → Impure soil

→ Energy → ~~Energy~~ Everywhere
- → High
- → Urbanization
- → Light pollution, Heat increase

→ Sound → Airport
- → Mid to High
- → Transport of Air
- → Health, Perception of animals

Hydraulics & Hydrology Engg.

Hydrology

→ Dam
→ Catchment area → Origin of a water source

① Calculating quantity of Water
② Fixing catchment area
③ Analysis of demand of water
④ Facilitating supply of Water to required places

Roads

Transportation Engg.

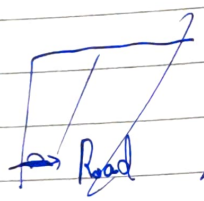
Roads

- Roads
- Good designed road
- Good designed & Constructed Road
- Good designed, Constructed Road
- Overall good performing road

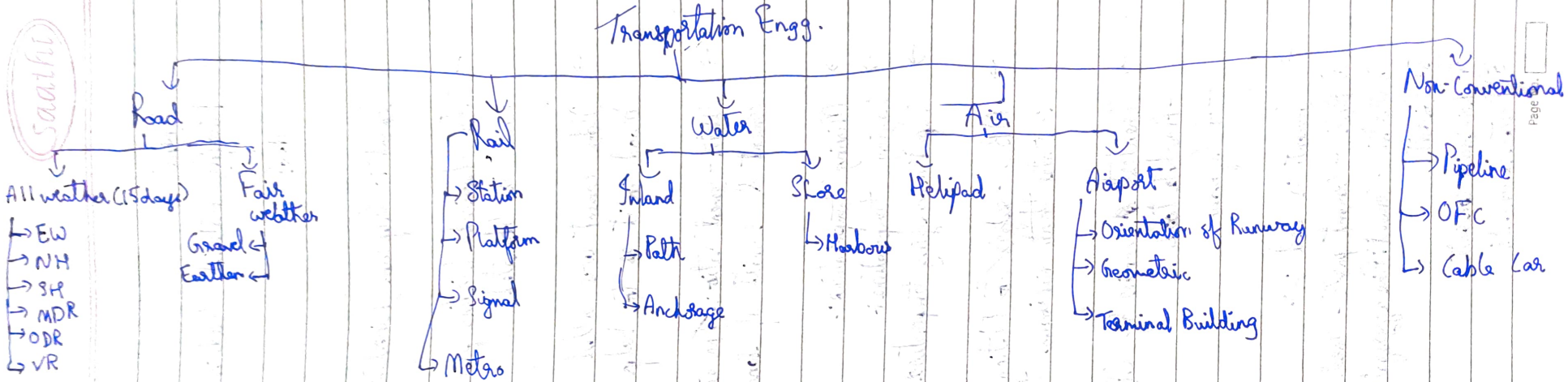
Traffic

- Engineering
- Education
- Enforcement

→ Transportation overlay: Movement of people & goods from point A to B through different modes of transportation.



* Locopilot
* Navigable depth - Minimum depth for a ship to pass through a river.
* Break water
* Wind Rose diagram


Transportation Engg.
Road
All weather (15 days)
EW
NH
SH
MDR
ODR
VR
Fair weather
Gravel
Earthen
Rail
Station
Platform
Signal
Metro
Water
Inland
Path
Anchorage
Shore
Harbour
Air
Helipad
Airport
Orientation of Runway
Geometrics
Terminal Building
Non-Conventional
Pipeline
OFC
Cable Car

Cement

→ Binding material Used in Construction.

How?

Cement :- Gypsum, Limestone (Lime) ← Base materials

→ The chemical binding process is an exothermic reaction. Thus heat is liberated.

→ Older cement was called limestone concrete and had traces of blood in it as to help in the binding action.

→ Water-cement ratio :- The ratio of water required for 1 unit of cement & 3 units of sand.

→ Mixing temperature :-
→ Laying temperature :-
→ Compact managing temperature :- } Various temperatures required for maintaining cement

→ NBC - ~~xxxxx~~ National Build Code
:- States that minimum thickness must be 8-inch column.

→ Greatest enemies of CE :-
- Architecture
- A layman

→ Cement is used in :-
① Paste - Cement paste - used in minor repairs - Less than 1% of cost.
② Mortar - Cement : Fine aggregate - Stone masonry, Brick masonry, Plastering
③ Concrete
④ Reinforced concrete
⑤ Prestressed concrete

Date / /

(2) Mortar 1:3 → Cement : Fine aggregate
→ Brick masonry
→ Stone masonry
→ Plastering
→ Pointing
→ Repair & Retrofitting Works

(3) Concrete: Cement : Fine aggreg. : Coarse Aggreg.
Good at compression load
mix design
[Plain Cement Concrete] (PCC)
→ Bed Concrete
→ Plinth beam without concrete

(4) Reinforced Cement Concrete ← Good at tension load
→ Beams
→ Columns
→ Roofs
→ Bridges

(5) Prestressed Concrete:
→ Premium application in construction

→ Concrete is second most used substance in the world.
→ Concrete is also the second biggest contributor to global carbon emission.

w/c ratio

Minimum 0.33 to 0.35 — Maximum 0.5 to 0.6

Chemical reaction
0.28

Heat Absorption
0.05 to 0.07

Initial Setting Time — Final Setting Time

→ Retarders are used to prolong the initial setting time

Workability

33% 50% 99%

★ Curing - from ~~28~~ upto 28 ~~28~~ days
→ Done for Strength gain
→ Heat of Hydration is absorbed by water.

Grades of Cement

→ 33-grade
★ → 43-grade
→ 53-grade

→ Fine texture
→ No lumps
→ Water bucket test

Stones

Classification (Geological) based on Rock | Classif. based on Chemicals | " " Physical

Igneous | Metamorphous | Sedimentary

(Geo) :-

Igneous :- → Heavy load ⟶ Load applications
→ Easily available in India

Metamorphic :- → Metamorphosised sedi & igneous rocks
→ due to metamorphous agents
→ Slate

Sedimentary :- → Sandstone

~~Physical :-~~

Construction Planning & Management

It is the science & art of planning, organizing, leading & controlling the work of organization and of using all available organization resources to reach stated organization goals.

(2) Material
(3) Money
(1) Manpower
(4) Machinery

} 4 M's of Management

B/c ratio (Benefit by Cost ratio)

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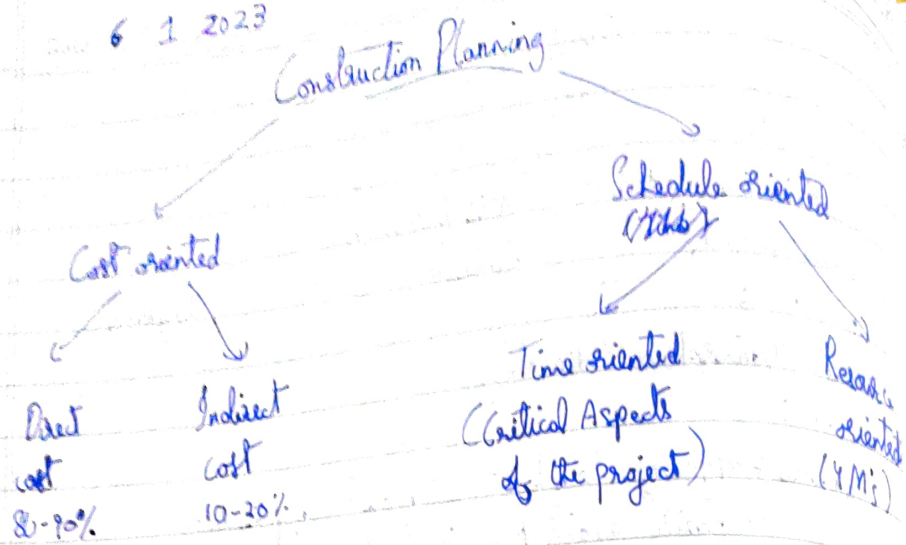

Objectives of Construction Management

① → Preparation
② → Selection
③ → Interpretation & Explanation
④ → Work Progress
⑤ → Collaboration
⑥ → Instruction & Supervision
⑦ → Response
⑧ → Comply with the requirement

① Of reports such as cost estimates, budgets, work schedules and other work documentation

② Of appropriate Construction methodologies for the timely work execution

③ Interpretation & Explanation of Contracts & technical information to professionals & workers

④ Preparation & budgetary allocations, budgetary requirements

⑤ between various agencies, architects, engineers, special requirements in case of emergencies

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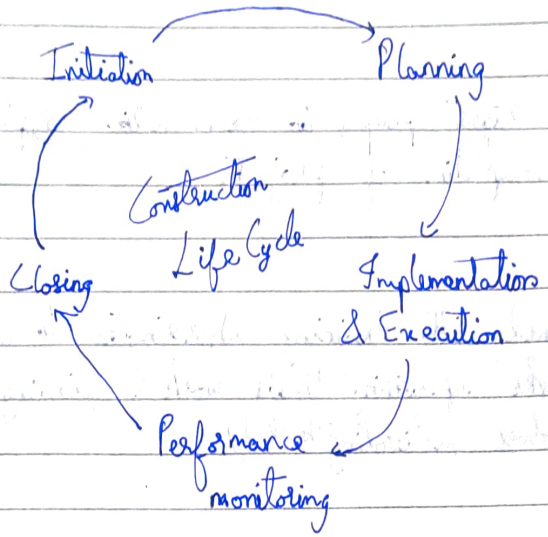
(6) Rates of activities, updation of periodic progress for the various associated activities

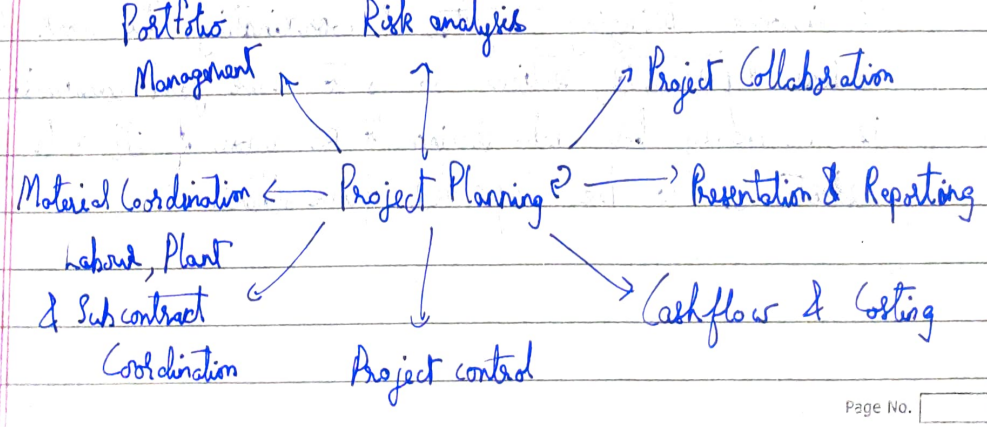
(7) to work delays, associated problems & emergencies

(8) Complying with requirements such as legal, technical, safety, environmental & other requirements.



Functions of Construction Management

(1) Planning: It is the process of selecting a particular method & the order of work to be adopted for a project from all possible ways & sequences in which it could be done. It essentially covers what to do and where to do.



② Time Scheduling:
It is fitting of the final work plan to a time scale. It shows the duration and order of various construction activities. It deals with when to do.

③ Organising:
It is concerned with the division of the total content of the work into manageable depts, sections & systematically managing various operations by delegating specific tasks to individuals.

④ Staffing:
Provision of right people to each sector, dept. created for successful completion of project.

⑤ Directing:
It is concerned with training subordinates to carry out assigned tasks, supervising their work & guiding their efforts. It also involves motivating the staff.

⑥ Controlling:
Involves constant review of the work, plan to check on actual achievements & to discover & rectify deviation through appropriate methods.

⑦ Coordinating:
It involves bringing together & coordinating the work of various departments, sections so as to have good communication, it is necessary for each section to be aware of its role & the assistance to be expected from others.