

GEOLOGY

Notes by-

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Engineering Applications

Geological problems in tunnelling :- ① Rock fall

② Percolation of water: No. 1 enemy

Geological investigation at tunnel site :-

- ① Taking bore hole at @ 6 m c/c along proposed line of tunnel.
- ② Inclined bore holes.
- ③ Trench excavation.
- ④ Horizontal drill.

Geological problems during tunnelling due to :-

a) Soft Rock :- ① Rock fall.

- ② Percolation of water.
- ③ Instable
- ④ Permanent lining & Temporary support reqd.

b) Hard Rock :-

1) Compact Basalt :- ① closely jointed.

- ② Rock fall
- ③ Percolation of water.
- ④ Permanent lining & Temporary supports.

2) ~~Amygdaloidal~~

Amygdaloidal Basalt :- ① Poorly jointed.

- ② No rock fall or percolation problem.
- ③ lasting reqd.

c) Bedded / Dipping rock :-

[Sedimentary, metamorphic rock occurring as thin bed]

① Tunnel should aligned w.r.t. dip & strike.

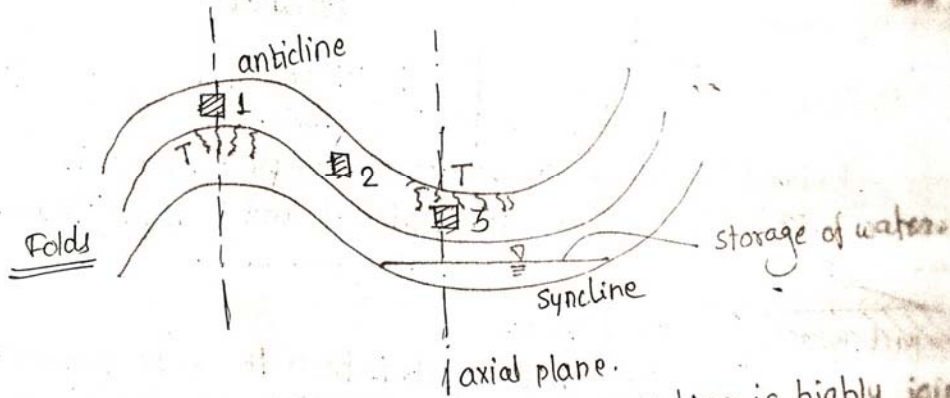
- ② Tunnel aligned across strike has less over break than aligned along strike.
- ③ When tunnel is aligned along strike of steeply dipping thin bed, upper unsupported portion may collapse. Hence it is better to align tunnel across strike than along it.

d) Tunnel through columnar basalt :-

- ① Highly jointed.
- ② Roof collapse
- ③ percolatⁿ of water.

- Tunnelling through folds:-
- ① Roof collapse / Rock fall
 - ② Water percolation

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Position 1 :- Not suitable as, axis of anticline is highly jointed
∴ Roof collapse occurs.

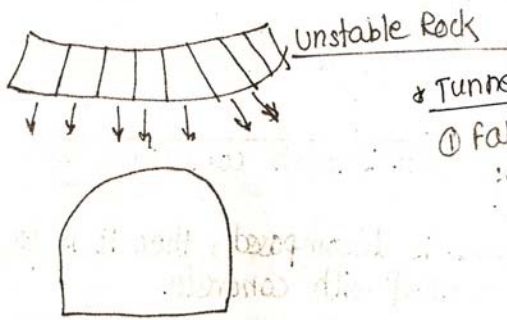
Position 2 :- Stable position & most suitable for tunnel.

Position 3 :- Worst position.

* Axis of syncline is highly jointed portion.
∴ Roof collapse occur.

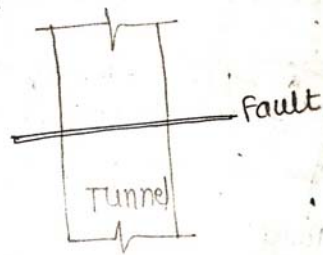
* Syncline are good storage of ground water, hence percolation of water is big problem.

* Joints are in reverse way, [opposite to arch] hence roof is unstable.

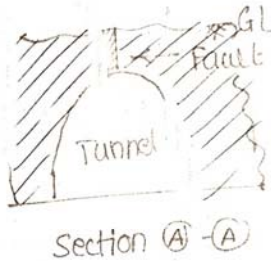
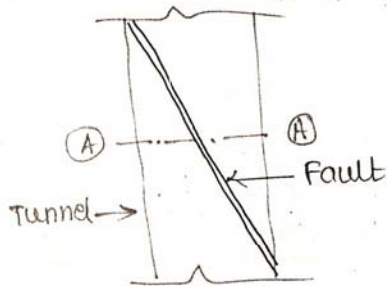


Tunnelling through fault

- ① Fault is across the alignment
∴ No problem only localised percolation



② Fault is along the alignment:-



- ① Lining Red.
- ② Roof collapse.
- ③ water percolation.