

* Ruling Gradients -

- ① This depends on the terrain, length of the grade, speed, pulling power of the vehicle & the presence of the horizontal curve.
- ② The IRC has recommended ruling gradient value of 1 in 30 on plain & rolling terrain, 1 in 50 on mountainous terrain and 1 in 16.7 on steep terrain.

B. Limiting Gradient -

- ① It is steeper than the ruling gradient.
- ② This gradient is adopted which the ruling gradient results in enormous increase in cost of construction.
- ③ It may be frequently necessary to limiting gradient.

C. Exceptional Gradient -

- ① Exceptional gradient are very steep, gradients given at unavoidable situations.
- ② They should be limited for short stretches not exceeding about 100m at a stretch.

Ques 3 Minimum Gradient -

- ① It depends on the rain fall, type of soil and other site conditions.
- ② A minimum of 1 in 500 may be sufficient for closed drain & 1 in 200 for open soil drains are found to give satisfactory performance.

Ques 6 Marshalling Yards - Yards is a place where goods trains and other loads are received sorted out according to a plan and new trains formed and dispatched onwards.

2) Locomotive - The word locomotive originates from the Latin loco - from a place oblique of locus place and the medieval Latin motives causing motion locomotive engine which was first used in 1814 to distinguish the self-propelled and stationary engines.

3) Coning of wheel - The sum of flanges of the wheels are never made flat but they are in the shape of a cone with a slope of about 1 to 20 this is known as coning of wheels.

Advantage of coning the wheels

- ① Coning the wheels reduce the depreciation of the wheel flange and rails.
- ② Depreciation is caused because of the friction action of flange with inner faces of the rail top. Coning also prevents to some extent the slipping of the wheels.

Ques-3 Historical development of Indian Railways -

1844 - First proposals for the construction of Railways in Indian were submitted to East India Company by R.M Stephenson, a Railway engineer in British India.

1849 - East India Company undertakes a construction of a 160 km Railway line from Calcutta to Mirzapur.

1850 - Contract undertaken by Indian Peninsula Railway for construction of a line from Bombay to Kalyan.

1853 - First Railway line between Boribunder (Bombay) and Thane (32 km) opened.

1854 - First train between Howrah and Hooghly (39 km) was run.