

→ Prev. day lecture.

$$= 0.0025 W + 0.0000015 V^2 W$$

↳ train load

[equating hauling capacity & train resistance]

$$15 = 0.0025 W + 0.0000015 (80^2) W$$

$$\Rightarrow W = 1240 \text{ ton}$$

↳ 1240 ton weight at velocity 80 km/hr

1240 ton

2nd part [gradient 1 in 200]

$$\text{Total resistance} = 0.0025 W + 0.0000015 V^2 W + \frac{1}{200} W$$

$$= 0.0025 \times 1240 + 0.0000015 V^2 \times 1240 + \frac{1240}{200}$$

$$\Rightarrow V = 55.37 \text{ km/hr.}$$

$$\text{Speed reduction} = 80 - 55.37$$

$$= 24.63 \text{ km,}$$

Problem #2:

[maximum speed gradient राशुत गाय ह्यन
50 km/hr @ 1% - राशुत?]

total weight of train
= weight of locomotive + weight of wagon

$$\Rightarrow 180 + 26 \times 20$$

$$= 700 \text{ tones}$$

Rolling resistance of wagon

= wagon weight * resistance from each wagon

$$= [(26 \times 20) \text{ tones} \times 2 \text{ kg/tones}]$$

$$= 1040 \text{ kg}$$

Rolling resistance of locomotive = (180×3)
= 540 kg

$$\therefore \text{Total rolling resistance} = 10401540 = 1580 \text{ kg} \\ = 1.58 \text{ ton.}$$

$$\text{Velocity resistance} = 0.0016 v^2 \times w \\ = 0.0016 \times (50)^2 \times 700 \\ = 2800 \text{ kg} \\ = 2.8 \text{ ton.}$$

Let $\sin \lambda$ be the steepest gradient.

On a straight level track,

$$\text{Train resistance} = \text{Rolling resistance} + \text{Resistance due to speed} + \text{Resistance due to gradient.}$$

$$\text{Now, resistance due to gradient} = \frac{1}{\lambda} \times w$$

So, we can write,

$$15 = 1.58 + 2.8 + \frac{700}{\lambda}$$

$$\Rightarrow \lambda = 66$$

λ in 66

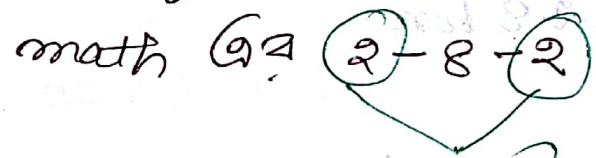
આનકે 10:12 seminar room @ extra class

Rolling Stock

- Railway ରେ ଥିବା ମୋଟର ଟ୍ରାକ୍ ଓ ଟ୍ରାକ୍ ଉପରେ ଚଳେ ।

* Locomotive \rightarrow engine.

* driving wheel \rightarrow ଟ୍ରାକ୍ ଉପରେ ଚଳେ ।



driving capacity ନାହିଁ ।

* driving wheel ଯାହା ଟ୍ରାକ୍ ଉପରେ ଚଳେ, ତାହା ଟ୍ରାକ୍ ଉପରେ ଚଳେ ।
hauling capacity ହାଏ ।

* wt on driving wheel ଯାହା ଟ୍ରାକ୍ ଉପରେ ଚଳେ, ତାହା ଟ୍ରାକ୍ ଉପରେ ଚଳେ ।
power ଦାଏ ।

* well & wagon carry କରନ୍ତି - ଟ୍ରାକ୍ ଉପରେ ଚଳେ ।

length & width ଦୈର୍ଘ୍ୟ ଓ ଚଉଡ଼ା ।

Coach:

passenger carry करे।

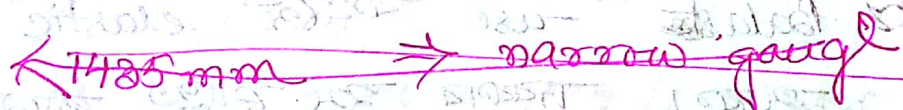
Wagon:

Heavy goods carry करे।

* हार्ड gauge के inner edge तक

inner edge के perpendicular distance

के gauge length (हार्ड)



→ Gauge width का हार्ड:

⇒ cost कम

⇒ speed कम पाठन-करे।

⇒ hilly area को not recommended.

Permanent way:

* sleeper and नीचे balast থাকে

Requirements of an ideal permanent way:

১. uniform gauge হবে
২. Friction minimum হতে হবে।
৩. Repair/replace করা facility থাকতে হবে।
৪. Track leveled হতে হবে, dip and superelevation
৫. Balast use করলে elastic property থাকবে। দ্রবণের সমস্যার জন্য অনেক impact value থাকবে।
৬. Even and uniform gradient দিতে হবে।
৭. Curve এ careful হতে হবে। প্রধানly detail বসিয়ে চান্স দেবে।
৮. Lateral deflection হতে সাবধান না।
৯. কম maintenance এই রকম হয়।
১০. Detail অনেক রকম করে করা হয়।
১১. দ্রবণের ক্রিয়াকারী রকম চুঁকি না হওয়া।

22. જાનિ ડામરો સાવરૂ ના

26. જોનિ care fully design કરવો હર,

28. વેલ્ડ જન ના રૂપ,

Rail

Load \rightarrow rail \rightarrow sleeper \rightarrow balast.

Requirements of an ideal rail section:

* Head જન thickness ઓ વધુ વજન

સાથે હર, - વગરન with time વધુ ઓ - અર
હરો આરો,

* Material સવ ધાન પ્રમાન આરુર,

* web thickness ઓ હને buckle વરો,

Type of rails:

1. Double headed \rightarrow head & foot अर्थात्,

2. Bull headed \rightarrow head बड़, foot छोटी;
so stability कम,

3. Flat footed \rightarrow foot बड़, head छोटी;
अवशेष्ये ह्यसि stable.

4. Double headed rail

\rightarrow dimension अलग-अलग करके रखना 4

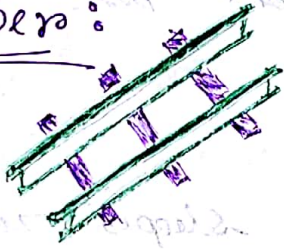
* dimension country to country vary करे।

* Chair \rightarrow Rail के नीचे cushion के अंतर्गत
then नाई बने जायाहोगा इस। Flat footed
नाही।

* Kinks \rightarrow अस्थिर joint आके, अस्थिर
- यदि lateral displacement करे।

अथवा, ठीके kinks करे।

Sleepers:



→ gauge length properly maintain - कदा possible

शुद्धी ना sleeper द्वारा

Requirements of an ideal sleeper:

* sleeper का weight बलाने वाले balast के लिये समतल
- चाहिए,

* Derailment होने wheel rail चिप ना गिरने
sleeper चिप - याव। अन्य तब sleeper लगे - क ना -
- मर जावे।

** rail का parallel sleeper को चले longitudinal
sleepers.

** rail का perpendicular direction के लिये
- transverse sleeper.

Ballast

- level राख track को ।

- Ballast के stone use क्या हुआ है

↳ जानि मुव कम absorb करता

↳ जूठ - जानि drainage करत है

↳ ना हले जाह उभाते गारे!! (o)

* Ballast elastic property थारके ; ना
शाबुन/brittle रहने हले थार ।

* Normal concrete के लिए ~~the~~ absorption allow
करत है (2-3%) . Ballast almost not allowed .

* ACV value 20 कम, material को strong .

* Los angels abrasion value कम करत ,

* कौन use हु — Broken stone
— Gravel
— Brick [गोबर (दूध)]

Stations & Yards:

Station એ સાર્વજનિક communication કરવા
સ્થળ,

* Flag station:

→ Train એ movement control

કરવા થાય.

→ ધાતુક ઊંચનામ કરવા,

* Block station:

→ Move કરવા permission નાહો

* express train time bound થાય, વધુ
કામ નાહો થાય.

* Platform પર સાર્વજનિક passenger &

goods take up કરવા.

□ Features of railway station:

- Public requirements
 - for goods
 - for passengers.

For passengers:

- -----
- guide
- refrigerator.
- Office
- Name board
- Police
- guide map
- reservation chart
- ticket rate chart.

Traffic requirements:

- Booking passengers and goods apparatus.
- signal.
- sidings
-
- goods loading & unloading platform
- accommodation of staff
- lift.

for locomotive:

- engine fuel
- cleaning & examining locomotive.
- inspection & repairing of wheels.

General requirement:

- proper approach road.
- proper time showing clock.
- Availability of coolie
- अनेक छेला platform आवस्य फुट ओवर ब्रिज

Types of stations:

⇒ Wayside station:

एक ठाम स्थानी ट्रेन ले जाऊ घुल्य-
अन्य ट्रेन पास वयात सुवास राखे)

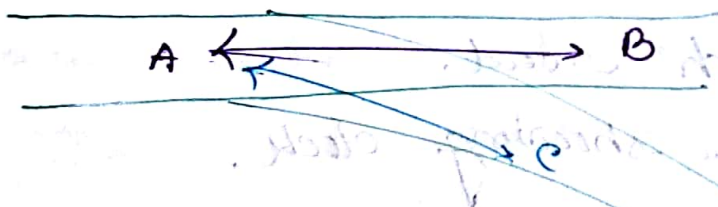
for single line track.

- Opposite direction वे ट्रेन cross करु,
- same direction " एका speed " " "

dal line 9- राखता.

Junction:

একধর্মিক branch line বিশেষ station
এ একধর্মিক main line এর সাথে main
line / branch line double ও হতে পারে।



terminal:

সমাপন করে - সাধা লাইন হয়।

Next els → els test.

Syllabus: ৩৩ লক্ষ্য পর্যন্ত

29.11.2017

Types of yards

- A. Passenger yards.
- B. Good yards.
- C. Marshalling yards.
- D. Locomotive yards.

☐ Passenger yards:

Goods বাধা হয়।

☐ Marshalling yards:

Good এর storage এর station এ থাকে না।

কিছু certain location এ marshalling yard

বাধা হয়।

* works as heart of goods transportation.

☐ Types of Marshalling yards:

1. Flat yard:

— ছোট আয়তাকার বস্তু - পরি, capacity

— ক্রম স্থিতি না।

— Ground flat থাকে।

— Gravity এর জন্য influence নাই।

□ Hump yards:

এখানে train কে উল্লস স্থানা শর-
অর্থাৎ -সার-সহন gravity এর সুবিধা নিত পারে,
৩০০

3. Gravity yard:

Gravity use করে certain distance পর্যন্ত
-সার; then engine use করা হয়।

□ Requirements of a locomotive yard:

Points & crossings

* Train কে অস/বাস more করতে হলে
guided track বা special arrangement লাগে।

* Railway crossing: Point & track এর

সাধুতা হলে track থেকে অন্য track এ
-সার।

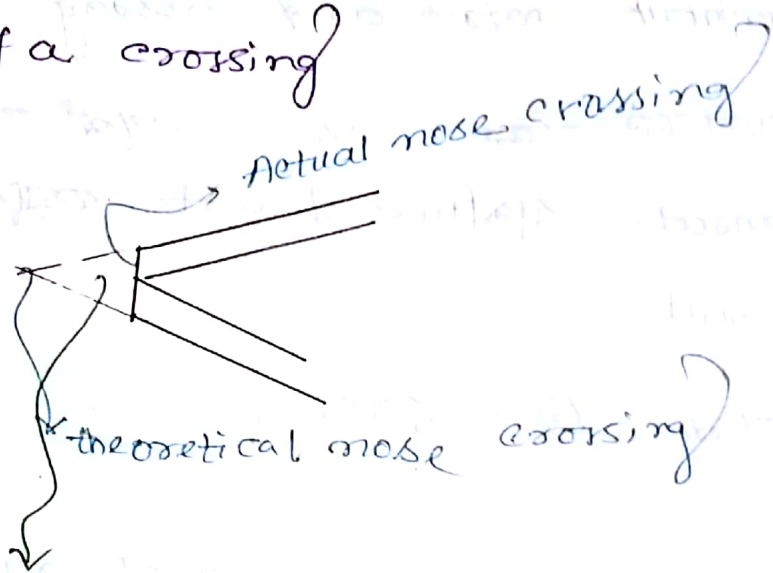
* diverging or converging হয় সাধু।

* flange এর সুবিধা: Detail স্থানা,

অসুবিধা: Cross করতে special
arrangement লাগে।

▣ Details of a point/switch

▣ Details of a crossing



জনকণ্ড শার্পেনেড বলে train চললে

ক্ষতি হতে পারে।

▣ Type of crossing:

• ...

▣ Cast Manganese steel crossing (CMS crossing)

* wear & tear কম হয়।

* ordinary ৩০ বছর বলে এখানে ৮ বছর করে,

* Component কম লাগে।

Spring or movable crossing:

main track or fast moving train &
branch or slow

চলমান ট্রেন used হয়।

* stretchers বাবু হেড পরিবর্তন helical spring
নে ব্যবহার করে করা হয়।

Position of sleepers at points and crossing.

* Length of sleeper অনেক বড় হয়।

☐ Repeater signal:

উদ্দেশ্য: আবার signal কে repeat করা, by any chance যদি স্মার্ট ড্রাইভার মিস করা থাকে
সুতরাং)

☐ Shunt signals:

* Horizontal আলো red.

* Inclined আলো green

☐ Inter locking:

* train safety ensure করার জন্য।

* Human error কমাতে।

* Automatically set & locked করে।

☐ Space interval method:

* কয়েকটি block এ ভাগ করে whole path চুকে।

* আবার block এ train থাকলে red

signal is shown.

13.12.2017

* आजकल Lecture एवं उभार CT.

* इस प्रकार रेलन alignment आक आकार or object
आक, आक bypass ब्यार कुन Curve use
हय ।

* track के direction change हुन horizontal
Curve के सिरे ,

* अथन diff. gradient - अथन - अथन , अथन
vertical curve use करे ,

* Curve अत स्थिति, अत स्थिति super.
elevation provide करेते हय ।

* Inner edge आक outer edge raised
आक

* Curve के radius वा degree सिरे
define करे हय ।

* railway के directly $1750/R$ सिरे
सिरे करे ।

* Chord length 30m सिरे math करे
हय । सिरे अथन करेते हय ।

* factors of degree of curve:

- (i) Gauge :
- (ii) wheel base of vehicle
- (iii) Max^m permissible super elevation.

□ Super elevation:

→ एका cant उ वने ।
→ Inner rail वर बाहेर outer rail
gradually change वर करे
→ reference rail, maintained at
original level.

→ Super elevation फायदे वरवने:

१. Better distribution of load! Otherwise centrifugal force वर बाहेर out rail वर (वरील load गडबड)

२. Outer वर वरील load - गडबड wheel वर wear & tear वर,

३. Lateral force वर neutralize वर

४. Jerking वर वरदि super elevation वर

শিথ, এখন discomfort হও।

☐ Equilibrium speed:

→ total balanced system.

☐ Maximum permissible speed:

→ Track এর super elevation এর জন্য maximum speed ও চমকো - পারে, এর AS usual speed limit, তার থেকে বেশি হওয়া যায় না।

☐ Cant deficiency:

একই curve এ যে speed যেনা আছে, যদি তার থেকে বেশি speed - এ চলে, এখন provided cant & এই speed এর জন্য required speed cant এর পার্থক্য।

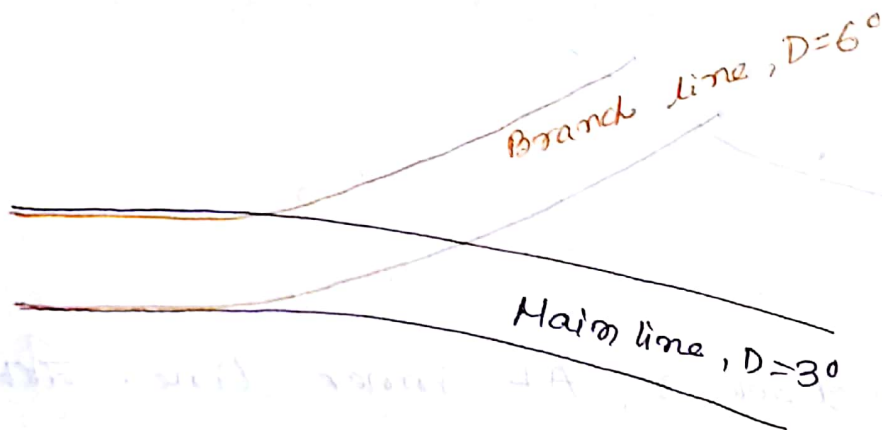
☐ Cant excess:

যেহাen super elevation বেশি, train যে speed এ চমকো পারে না, সে হতে super elev. না দিলে হত।

* গাড়ি curve point সারি পারেন নাহ।
(not important)

Problem

A six degree (6°) curve branches from a three degree (3°) curve in an opposite direction in the layout of a broadgauge yard. If the speed on the branch line is restricted to 85 kmh^{-1} . Determine the speed restriction in the main line. Assume permissible deficiency in cant is 75 mm .



$$\text{Super elevation for branch line} = 1.315 \frac{V^2}{R} \text{ for BG (cm)}$$

V is in kmh^{-1}

$$R = \frac{1750}{D} \times (30.5) \text{ m}$$

$$= \frac{1719}{D} (30 \text{ m})$$

$$\therefore \text{Super elevation for branch line} = 1.315 * \frac{35}{\frac{1719}{6}}$$

$$= 5.622 \text{ cm}$$

\rightarrow given permissible deficiency in cant.

$$\text{Negative super elevation} = 5.622 - 7.5$$

$$= -1.878 \text{ cm}$$

$$\text{Super elevation for main line} = 1.878 + 7.5$$

$$= 9.378 \text{ cm}$$

$$\text{Super elevation} = 1.315 \frac{V^2}{R}$$

$$\Rightarrow 9.378 = 1.315 * \frac{V^2}{\frac{1719}{3}}$$

$$\Rightarrow V = 68.93 \text{ km/hr}$$

$= 68 \text{ km/hr}$ [rounding na karnaketa h,
]

aur karnaketa karnaketa h lower rounding karnaketa h, karnaketa h
 karnaketa actually karnaketa restriction
 - hite chahiye]