

Md. Mizanur Rahman

Lee-1

Brief History of Bangladesh Railway:

Im. Date স্থাপত্য বছর।

15 Nov. 1862	1896	1915-32	1972	2010
1874	1898-99	1924	1982	2011
1884	1903	1937	1995	
1885	1904	1942	1998	
1891	1909	1947	2007	
1895	1915	1954	2008	

Milestone event ২-৩ টি মনে রাখতে হবে।

- Allocation of business অনুসারে রেলসমগ্র ক্ষমতাসমূহের প্রধান বণ্যাবলী:
- Railway network in BD:
- Comparison between Railway and Roadway:
- Characteristics of railway
- Advantages of railway
 - economic
 - political
 - social
- Train Resistances:
 - resistance due to friction and wave action
 - " " " " curve
 - " " " " gradient
 - " " " " speed — 1) wind
2) uneven
- wind resistance = $0.000017 A \times v^2$
- uneven track = $0.000015 \times w \times v^2$

বাকসকে 10:00 টায়
extra class seminar
room এ - মিজান হায়েদার

Lee-2

0-8-0
↖ ↗
কোন idle wheel নই

Problem 1

• $\boxed{2-8-2}$

↑ ↑
idle wheel driving wheel (front)

Rear idle wheel

• Locomotive এর driving wheel যত বেশি, তার hauling capacity তত বেশি।

Designation of a locomotive

8 টা wheel driving → 4 axle

• Assume that, the hauling capacity of the locomotive is equal to $\frac{1}{6}$ times the load on driving wheels.

$$\therefore \text{Hauling capacity of the locomotive} = \frac{1}{6} \times \underbrace{(22.5 \text{ tons})}_{\text{axle load}} \times \underbrace{\left(\frac{8}{2}\right)}_{4 \text{ axle}}$$

$$= 15 \text{ ton} \quad \text{--- ①}$$

On a straight level track, train resistance = resistance due to friction and wave action + resistance due to speed

$$= 0.0025 W + 0.0000015 V^2 \times W \quad \text{--- ②}$$

Equating ① and ②,

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

$$\therefore W = 1240 \text{ ton} \quad \text{wt. of Train}$$

$$V = 80 \text{ km/h} \quad (\text{given})$$

For gradient of 1 in 200,

resistance = friction & wave action + speed + gradient

$$\therefore 15 = (0.0025 \times 1240) + 0.000015 \times (80)^2 \times v^2 \times 1240$$

$$+ w \times \left(\frac{1}{200} \right) \leftarrow \text{gradient}$$

wt. of train (= 1240 ton)

$$\therefore \boxed{V = 55.37 \text{ Km/hr}}$$

$$\therefore \text{Speed Reduction} = 80 - 55.37 = \boxed{24.63 \text{ Km/hr}}$$

Problem 2

Total weight of the train = wt. of locomotive + wt. of wagons
 $= 180 + (26 \times 20) = 700 \text{ Ton}$

{ Rolling resistance of wagons = $(26 \times 20) \times 2 = 1040 \text{ kg}$
" " " locomotive = $180 \times 3 = 540 \text{ kg}$

\therefore Total rolling resistance = $1040 + 540 = 1580 \text{ kg} = 1.58 \text{ ton}$

$$\begin{aligned} \text{velocity resistance} &= 0.0016 v^2 w \\ &= 0.0016 \times (50)^2 \times 700 \\ &= 2800 \text{ kg} = 2.8 \text{ ton} \end{aligned}$$

Let 1 in x be the steepest gradient.

On a straight level track,

$$\begin{aligned} \text{Train resistance} &= \text{Rolling resistance} + \text{Resistance due to} \\ \text{Traction effort} & \quad (\text{speed} + \text{gradient}) \\ \text{of locomotive} &= 1.58 + 2.8 + \underbrace{700 \times \frac{1}{\alpha}}_{\substack{W \\ \text{gradient}}} \\ &= 4.38 + \frac{700}{\alpha} \end{aligned}$$

$$\therefore 15 = 4.38 + \frac{700}{\alpha}$$

$$\therefore \alpha = 65.91 \approx 66$$

$$\therefore \boxed{1 \text{ in } 66} \text{ gradient}$$

□ Rolling Stock :

- Component : 1) Locomotive ← (অবশ্যই স্বল্প hauling capacity আছে।)
- 2) coaches
- 3) Wagons

→ coaches :

→ wagons :

□ Rail gauges :

• ২টি rail line এর সবিস্তী দূরত্ব।

• BD ত 1000 mm Meter gauge use হয়।

→ Classification of gauges :

Broad & Meter gauge টাইপে বেশি use হচ্ছে থাকে যুগে worldwide.

→ Factors affecting the choice of a gauge.

• Gauge যত বড় হবে, speed তত বেশি হবে।

→ Uniformity of Gauges:

• Meter gauge এর rolling stock broad gauge ত use করা যায় না।

Lec-3 [Lec 1→3 দ্রষ্টব্য C.T next class ত
Math+Theory]

Lec-4

→ Stations and yards:

Function অনুযায়ী → 1) Flag station
2) Block "

→ purpose of railway station:

→ site selection for a railway station:

→ Features of Railway station:

→ Type of station:

1) wayside (single train track)

2) Junction (অনেকগুলো line meet করে) (Different direction এ যাবার সুযোগ থাকে)

3) Terminal (যেখান থেকে line শুরু বা শেষ হয়) Size এ অনেক বড়

Lec-6

- Point and crossing:

Lec-7

- Signaling and Interlocking:
- Objective of signaling:
Shunting → rail মথন অর্থাৎ direction change বন্ধ
- Classification of signal: (সুখ্মত বক্ষয়)

Fig 31.1 (সুখ্মত বক্ষয়)

Table 31.2 (সুখ্মত)

- Semaphore signal (যেটি use করা হয়)
sign to show

- horizontal আবলন line clear লাই
- ~~vertical~~ " " " আছে
- inclined

- Colored light signal:

- Calling on signal:

- Co-acting signal:

- Repeater signal:

- Shunt signal:

- ~~31~~ Sighting Board:

- Signaling System:

Q_m • Comparison of signalling system :

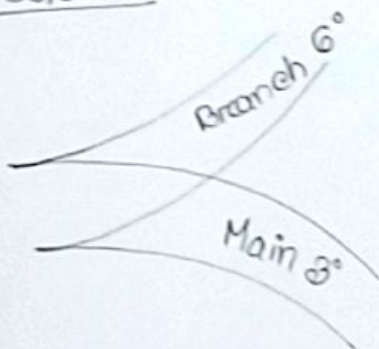
- Interlocking
- Space interval method :

Lec-8

Math

A 6° curve branches off from a 3° main curve in an opposite direction in the layout of a broad gauge yard. If the speed on branch line is restricted to 35 km/hr, determine the speed restriction on the main line. Assume permissible cant deficiency as 25 mm.

Solution



superc elevation of branch line
(for broad gauge)

$$= 1.815 \frac{v^2}{R}$$

$$= 1.815 \frac{(35)^2}{1719/6}$$

$$= 5.622 \text{ e.m}$$

$$\left[\begin{array}{l} v = \text{km/h} \\ \text{superc elevation (em)} \end{array} \right]$$

R → unit (m)

$$R = \frac{1750}{D} \text{ (for chord length 30.5m)}$$

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

$$\begin{aligned} \text{-ve superc elevation} &= (5.622 - 7.5) \\ &= -1.878 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Theoretical SE on main line} &= 1.878 + 7.5 \\ &= 9.378 \text{ cm} \end{aligned}$$

$$\text{SE} = 1.315 \frac{v^2}{R}$$

$$\therefore v = \sqrt{\frac{\text{SE} \times R}{1.315}}$$

$$= \sqrt{\frac{9.378 \times (1719/3)}{1.315}}$$

$$= 63.93 \text{ km/hr}$$

$$\approx 63 \text{ km/hr}$$