

## UNIT-1 Introduction to Railway Engineering

QUESTION 1 List the modes of Transportation system . (Sum-24, Marks-2) .

ANS: 1- Roadways      2- Railways      3- Airways      4- Waterways

QUESTION 2 List Two merits of roadways over Railways. (Sum-24, Marks-2) .

Ans: 1- It is economical as compare to Railways.

2- It is very convenient for passenger for small goods transport.

3- Small vehicles can be driven on roads for personalized transport.

4- Maintenance cost is less as compare to railway.

QUESTION3. List out any four zones of Indian Railway. (Sum-22, Marks-2)

ANS : i. Eastern Railway.      ii. South Eastern Railway.      iii. Northern Railway.  
iv. North Eastern Railway.      v. Southern Railway.      vi. Central Railway.  
vii. Western Railway.      viii. South Central Railway.

QUESTION 4. Define rail gauge. (Sum-23, Marks-2) (Sum-22, Marks-2)

ANS: **Rail Gauge:** The clear horizontal distance between the inner (running) faces of the two rails forming a track is known as rail gauge.

QUESTION 5. State the role of transportation in the development of nation.

(Sum-22, Marks-4)

ANS: Transportation plays a very important role in the development of Nation in the following ways:

- i. Easy and quick transportation of men, machines, animals, material and goods can be made.
- ii. Transportation system increases the social awareness among people.
- iii. Transportation is essential for strategic movement in emergency for defense of the country and to maintain better law and order.
- iv. Transportation Network creates job opportunities for millions of people.
- v. Transportation through air ways plays an important role of communication to the people staying in remote area and also helps the people in difficulties during floods.
- vi. Areas which are connected by proper means of transport can developed fast.

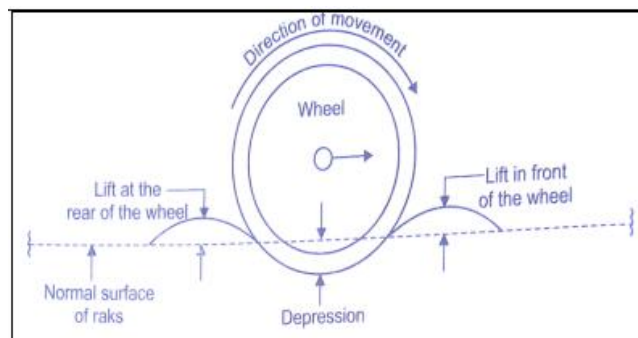
**QUESTION 6. Explain any two causes of creep of Rail with a neat sketch**

(Sum-22, Marks-4)

ANS: The following are the principle causes of creep:

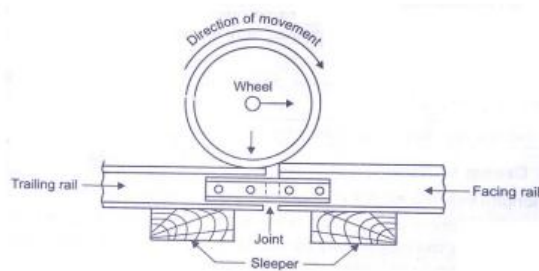
**i. Wave action or Wave Theory:**

Wave motion is set-up in a resilient track by the moving wheel loads. The train wheels causes depression under themselves forming lifts or crests. With movement of wheels, the lifts on front of the moving wheels are carried forward whereas the lifts at the rear of the moving wheels get back to their normal position. Thus, the rails are pushed forward which causes creep in the forward direction.



**Fig. Wave Theory of Creep**

**ii. Percussion Theory:** The rail creep is due to impact of wheels at the end of facing rail at each fish plate joint as shown in figure. When the wheel pass over such a rail joint the trailing rail depresses down and the wheel give impact to the end of facing rail, which results creep in forward direction.

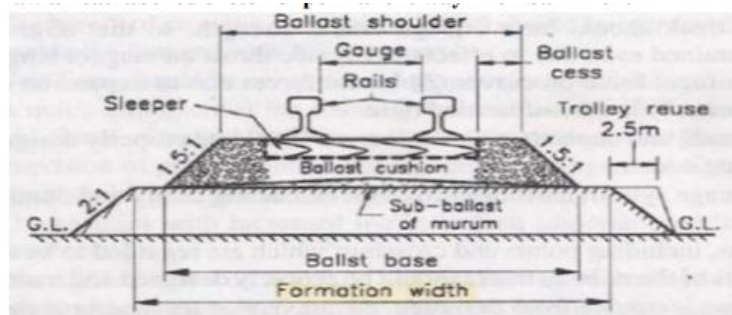


**Fig. Percussion Theory of Creep.**

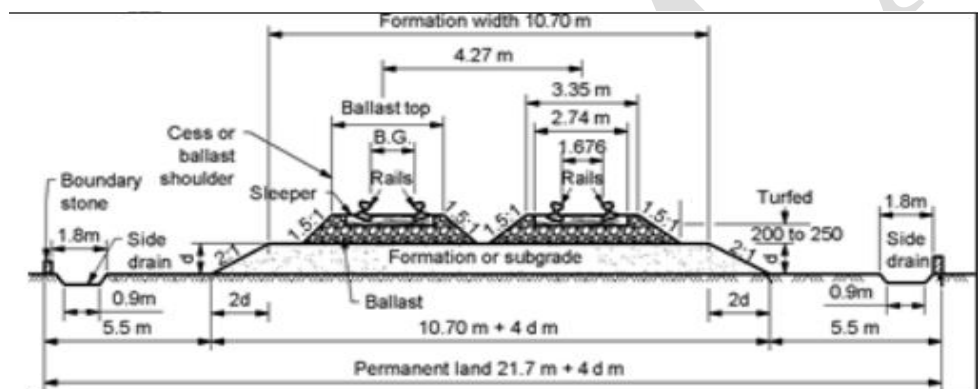


QUESTION 11 Draw a neat labelled sketch of permanent way in embankment.

(Win-19, Marks-4)



Cross section of permanent way in embankment (Single track)  
OR



Cross-section of a double broad gauge track in embankment

QUESTION 12 Discuss the requirements of a standard rail joint.

(Sum-24, Marks-4) (Win-19, Marks-4)

- Ans:
- It should be strong, stiff and give same strength as that of the original rail section.
  - Under lateral and varying load, it should maintain the gauge distance of track.
  - It should be cheap and durable.
  - It should not allow rail end to be battered in any case.
  - It should absorb shocks and vibrations produced due to movement of train.
  - It should facilitate easy removal and replacement of rails without disturbing the whole track.
  - It should be capable of maintaining the two rails at the same level.
  - It should provide free expansion and contraction due to temperature variation.

**QUESTION 13** Write two merits of roadways over railways (Sum-19, Marks-2)

Ans:

1. They provide door to door service.
2. In hilly or mountainous region, roads are the only means of conveyance.
3. They help to provide medical aid to remote places.
4. They transport men and material from one part to other speedily and easily.
5. A number of small units like rickshaw, cars, scooter etc are available for personalized transport.
6. The roads can be improved in terms of width and nature of surface as the demand of traffic grows.
7. Starting and destination points need not be necessarily defined.

**QUESTION 14** List the types of rail gauge. (Sum-19, Marks-2)

- Ans
- |                          |                         |
|--------------------------|-------------------------|
| 1. Broad gauge = 1676 mm | 2. Meter gauge 1000 mm  |
| 3. Narrow gauge = 762 mm | 4. Light gauge = 610 mm |

**QUESTION 15** Write the ideal requirements of permanent way.

(Sum-24, Marks-4) (Sum-19, Marks-4)

Ans: Ideal requirements of permanent way:

- I. The gauge should be uniform and correct.
- II. The alignment should be correct and the rails should be at the same level on straight portion.
- III. The track should be resilient. (i.e. there must be a certain amount of elasticity in the track)
- IV. The gradient should be uniform and any change in gradient should be followed by a smooth curve.
- V. The track should have enough lateral strength so that alignment is maintained.
- VI. Points and crossings and rail joints should be perfectly designed and maintained.
- VII. The radii and superelevation on curves should be properly designed and maintained.

**QUESTION 16** Discuss the ideal requirements of the sleepers. (Win-23, Marks-4)

Ans: 1- They should be durable.

2- They should be able to maintain correct gauge.

3- They should have moderate weight.

4- They should be able to resist impact and vibrations.

5- They should have less maintenance cost.

**QUESTION 17** Explain any four functions of rail fixtures and fastenings.

(Win-23, Marks-4)

Ans: **Functions of rail fixtures and fastenings:**

1. To connect rail end together and fixing rails to sleepers in a track

2. To secure arrangement between rails and sleepers and rails and rails.

3. To join one rail with other rail to maintain continuity of rails fish plates are used.

4. To maintain alignment of track both vertically and horizontally.

5. Bearing plate protect sleeper from sinking and damage caused by heavy load and increase life of sleepers.

6. Bearing plate helps to distribute load over large area of sleeper.

7. To fix rail, bearing plates, chairs to wooden sleeper spikes are used.

8. To connect fish plates to rail fish bolts are used. they are made from high carbon steel. To withstand shear.

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