1. 1 PERMANENT WAY:

The permanent way is the elements of railway lines: generally the pairs of rails typically laid on the sleepers or ties embedded in ballast, intended to carry the ordinary trains of a railway. It is described as permanent way because in the earlier days of railway construction, contractors often laid a temporary track to transport spoil and materials about the site; when this work was substantially completed, the temporary track was taken up and the permanent way installed.

The Main Components of Permanent Way are as Follows:

- Rails
- Sleepers (or Ties)
- Fasteners
- Ballast (or Slab Track)
- Subgrade

REQUIREMENTS OF AN IDEAL PERMANENT WAY:

Following are the basic requirements of a permanent way:

(i) The guage should be uniform and correct.

(ii) Both the rails should be at the same level in a straight track.

(iii) On curves proper super elevation should be provided to the outer rail.

(iv) The permanent way should be properly designed so that the load of the train is uniformly distributed over the two rails.

(v) The track should have enough lateral strength.

(vi) The radii and super elevation, provided on curves, should be properly designed.

(vii) The track must have certain amount of elasticity.

(viii) All joints, points and crossings should be properly designed.

(ix) Drainage system of permanent way should be perfect.

(x) All the components of permanent way should satisfy the design requirements.

(xi) It should have adequate provision for easy renewals and repairs

TYPES OF RAILS

The rails used in the construction of railway track are of following types:

1. Double headed rails(D.H. Rails)
2. Bull headed rails(B.H.Rails)
3. Flat footed rails(F.F.Rails)

DOUBLE HEADED RAILS

The rail sections, whose foot and head are of same dimensions, are called Double headed or Dumb-bell rails. In the beginning, these rails were widely used in the railway track. The idea behind using these rails was that when the head had worn out due to rubbing action of wheels, the rails could be inverted and reused. But by experience it was found that their foot could not be used as running surface because it also got corrugated under the impact of wheel loads. This type of rail is not in use in Indian Railways now-a days.

BULL HEADED RAILS

The rail section whose head dimensions are more than that of their foot are called bull headed rails. In this type of rail the head is made little thicker and stronger than the lower part by adding more metal to it. These rails also require chairs for holding them in position. Bull headed rails are especially used for making points and crossings.

FLAT FOOTED RAILS

The rail sections having their foot rolled to flat are called flat footed or vignole`s rails. This type of rail was invented by Charles Vignole in 1836. It was initially thought that the flat footed rails could by fixed directly to wooden sleepers and would eliminate chairs and keys required for the B.H. rails. But later on, it was observed that heavy train loads caused the foot of the rail to sink into the sleepers and making the spikes loose. To remove this defect, steel bearing plates were used in between flat footed rails and the wooden sleeper.

SLEEPERS

Sleepers are transverse members of the track placed belos the rails to support and fix them in position.

FUNCTIONS OF SLEEPERS

Sleepers serve the following functions:

(i) To hold the rails to proper gauge.
(ii) To transfer the loads from rails to the ballast.
(iii) To support and fix the rails in proper position.
(iv) To keep the rails at a proper level in straight tracks and at proper super elevation on curves.
(v) To provide elastic medium between the rails and the ballast.
(vi) To provide stability to the permanent way on the whole.

TYPES OF SLEEPERS

Sleepers are of the following types:

1. Wooden sleepers.
2. Steel sleepers.
3. Cast iron sleepers.
4. R.C.C. sleepers.
5. Priestesses concrete sleepers.

BALLAST

Ballast is the granular material usually broken stone or any other suitable material which is spread on the top of railway formation and around the sleepers.

FUNCTIONS OF BALLAST

Ballast in railway track performs the following functions.

(i) To hold the sleepers in position and preventing the lateral and longitudinal movement.

(ii) To distribute the axle load uniform from sleepers to a large area of formation.

(iii) To provide elasticity to the track. It acts as an elastic mat between subgrade and sleepers.

(iv) To provide easy means of maintaining the correct levels of the two rails in a track.

(v) To drain rain water from the track.

(vi) To prevent the growth of weeds inside the track..

TYPES OF BALLAST

In India, the following materials are used as ballast.

(i) Broken stone.

(ii) Gravel

(iii) Sand

(iv) Ashes or cinders

(v) Kankar

(vi) Moorum

(vii) Blast furnace slag

(viii) Brick ballast

(ix) Selected earth

FIXTURES AND FASTENINGS

Fixtures and fastenings are fittings requires for joining of rails end to end and also for fixing the rails to sleepers in a track.

FUNCTIONS OF FIXTURES AND FASTENINGS

Rail fixtures and fastenings have the following functions:

(i) To join the rails end to end to form full length of track.

(ii) To fix the rails to sleepers.

(iii) To maintain the correct alignment of the track.

(iv) To provide proper expansion gap between rails.

(v) To maintain the required tilt of rails.

(vi) To set the points and crossings in proper position.

TYPES OF FIXTURES AND FASTENING

Fixtures and fastenings commonly used in a permanent way are of following types:

1. Fish plates
2. Bearing plates
3. Spikes
4. Chairs
5. Bolts
6. Keys
7. Anticreepers