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Q1:- Keeping in view different modes of Transportation compare railways with Highway.

Ans: Compare b/w Railway & highway.  
Railways:

- 1) A Railway consist of parallel rails over which a wheeled vehicle may travel. e.g; Train.
- 2) Railway Transportation is advantages for moving people and goods from one place to another using trains.
- 3) Railways provide faster service as compared to roadway (Highway).
- 4) It required a large amount of investment for its construction.
- 5) It is safer than roadway Highway (minimum crush rate of handled carefully).

## Highway:

- 1) A Highway is a multi-lane roadway that is especially built for high speeds and therefore connecting major population centers.
- 2) It provides maximum service at all points and provides door-to-door service and other modes are dependent on it.
- 3) It does not provide much faster service as compared to railway.
- 4) The engine cost of a motor vehicle is cheaper than a railway engine.
- 5) It requires a small amount of investment for its construction as compared to railway.

Q2:-

Ans: Office study is The first Phase in designing a new highway. It is The examination of all available data of The area of Proposed highway. By taking help from several sources such as Maps, charts, Photographs etc, The area is investigated.

Preliminary Analysis OF Data:

→ This step is usually Done by taking help from several Data sources e.g small -scale research Project and from other secondary sources.

→ The extracted data helps in indicating whether any specific site we should exclude for further consideration or not.

## Engineering Includes:

- > The topography of The area.
- > Geology of The area.
- > climate and traffic volume of The area.

## Social & Demographic Includes:

- > Land use and Zoning Pattern.

## Environment Includes:

- > Type of wildlife exists.
- > Location of archeological, historic sites.
- > possible effects of Pollution (air, noise, water).

## Economic Includes:

- > unit construction cost and trend of agricultural Industrial activities.

∴ After The analysis of all of The above data a transportation engineer becomes able to select The general area of Proposed area.

After That, Preliminary location survey is conducted in which following Evaluations are done.

### 1. Economic Evaluation:-

For determining The possible future effects of utilizing The resources during The construction period, This evaluation is conducted for each alternative route.

- Road user cost.
- Construction cost.
- Maintenance cost.
- Road user Benefits and dis-benefits.

### 2. Environmental Evaluation:-

For Determining The significant effect of construction on surrounding, This evaluation is done.

Following are The causes That badly effects The presence of living and non-living organisms.

- Plants are badly effected.
  - Deforestation.
  - Noise, air & water pollution that causes headaches, and other problems to the nearby residents.
- In short;

IT disturbs the equilibrium and leaves, significant impact on the environment.

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Q3: what is importance of vehicle performance in highway design.

Ans:- A vehicles at moves on a highway always accelerates and decelerates depending upon the traffic volume on that roadway. so these two parameters (acceleration and deceleration rate)

are often critical in determining the design of a highway.

For accommodating different type of vehicles (High traffic and low traffic) on a roadway, vehicle performance in highway design is studied.

Other rates that often govern the dimensions of design factors are:

→ Effect of Road Grade:

steep grade for truck climbing etc.

→ Effect of Horizontal curvature.

→ Highway Alignment.

→ Freeway ramps.

→ Timing at signalized intersections.

→ Turnout bays for Buses.

→ Effect of Pavement Friction.

→ Acceleration and Deceleration Lanes. etc.



Q4:- write short note on directional distribution in design of highway.

Ans: Directional Distribution is The Predominant one way traffic volume expressed as a Percentage of two-way traffic.

- > It is also known as The D factor and it is an important traffic parameter that is frequently used for design and operational performance analysis of a highway.
- > It accounts for the directional distribution of traffic and also used to convert average daily traffic to directional peak hour factor.
- > occasionally 80% is observed but typically one direction contributes 55-70% in total traffic.

For Example:

- > considered a rural road with a design volume of 4,000 vehicles Per hour (VPH) for both directions of travel combined.
- > If The directional distribution during The design hour equally splits or 2000 VPH in one direction, two lanes in each direction may be adequate.
- > If 80% of The DHV is in <sup>one</sup> direction at least Three lanes in each direction would be needed for The 3200 VPH.

Q5:- Explain broad classification of surface distress modes.

Ans: Surface Distress Modes:

Surface distress modes are broadly classified into 3 broad groups.

1- Fracture:

Fracture occurs in the form of cracking and breaking of pavement surface.

→ The reasons of Fracture are:

- Excessive Loading
- Fatigue (cyclic loading)
- Thermal expansion and contraction.

2- Distortion:

Distortion occurs in the form of deformation.

→ The reasons of Distortion are:

- Excessive Loading.
- weakness of base or sub-grade layers.

### 3- Disintegration:

The breakup of a pavement into small pieces is called Disintegration.

It occurs in the form of stripping or removal of paving materials such as aggregate etc.

→ The reasons of disintegration are:-

- Loss of bonding b/w pavement material.
- Abrasion due to traffic.
- Aggregate degradation.
- channel reactivity.

Q 6:- Explain Alligator cracking, block cracking, longitudinal cracking and Transverse cracking.

Ans:- Alligator cracking:

- It is called Alligator cracking because of the interconnected cracks which resemble as an alligator skin.
- It is considered a combination of fatigue and block cracking.
- The reasons of Alligator cracking are:
  - Load-related deterioration because of weak subgrade.
  - Too little pavement thickness.
  - Repeated traffic loadings.

## Block Cracking:

- It is a series of large rectangular blocks (Typically one foot or more) that appears in an asphalt pavement.
- This type of cracking typically occurs where there is no traffic.
- The reason of Block Cracking is the shrinkage of asphalt pavement because of temperature cycles.

## Longitudinal Cracking:-

- This type of cracking occurs parallel to centerline of asphalt pavement.
- The reasons of longitudinal cracking are:
  - Poorly constructed Joints.
  - Improper Paver operation.
  - Expansion & contract of pavement materials. These cracks are not load-related.

## Traverse Cracking :-

→ This type of cracking occurs perpendicular to the centerline of asphalt pavement.

→ The reason of Traverse Cracking :-

- Shrinkage of Asphalt layer or reflection from an existing crack.
- Poorly constructed Joints.
- Poorly roadbed settlement.

These cracks are not load-related.

END PAPER