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IN

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Section

A

Paper

Highway and traffic
Engineering

Q No 1:-

Difference btw Highway and rail way?

Highways:-

- It is used any public or private road to connect cities and town.
- Road are used by various types of vehicles i.e like cars, buses etc.
- It requires less investment from government of construction.
- It save time.
- Higher degree of accident occurs due to flexible pavement.
- This is only mode of transportation which is connected to railways, airport and sea port for transferring and collecting goods and people.

Railway:-

- For heavy and large loads over long land journeys.
- It depends upon the road transport. safety (minimum crash rate).
- Energy required to drag a unit load through unit distance by the railway is only $\frac{1}{4}$ to $\frac{1}{5}$ of that required to road.
- less accident occurs due to uniform movement.
- It's only connect one station to another.

Q No 2:-

ANS:- office study of existing information:

⇒ The first phase of any highway location study is the examination of all available data of the area in which the road to be constructed. This phase is usually carried out in the office prior to any field or photogrammetric investigation. All the available data are collected and examined.

⇒ The data include these characteristics:

⇒ Engineering (traffic volumes, climates geology).

⇒ Social and demographic (land use and zoning patterns).

⇒ Economic (unit cost for construction.)

Preliminary location survey:-

⇒ During this phase of the study, the position of the feasible routes are set as closely as possible by;

⇒ Establishing all the control points.

⇒ Determining preliminary vertical and horizontal alignments.

⇒ preliminary alignments are used for

⇒ Economic evaluation road user cost, construction cost, maintenance cost, etc.

⇒ Environmental evaluation, environmental impact statements.

Q No 3:-

Importance of ~~Highway~~ vehicles in Highway design

Performance of road vehicles forms the highways.

⇒ passing sight distance.

⇒ setting speed limit.

⇒ maximum grades.

⇒ Turnout bays for buses.

⇒ Acceleration and deceleration lanes.

⇒ Timing of signalised intersection.

⇒ Highway alignment.

⇒ free way ramps.

⇒ length of acceleration.

PN04

ID = 7795

PAGE (4)

Directional distribution in design of Highway

⇒ Highways must be designed to adequately serve the peak-hour traffic volume in the peak direction of flow.

⇒ Total hourly traffic in both directions is used to design two-lane roads.

⇒ Typically one direction contributes by 55-70% in total traffic, although occasionally 80% is observed.

Example:-

⇒ Consider a rural road with a design volume of 4,000 vehicles per hour (vph) for both directionals of travel combined.

⇒ If during the design hours, the directional distribution is equally split, of 2000 vph in one direction, two lanes in each direction may be adequate.

Q No 5:-

Surface distress:-

Surface distress is any indication of poor or unfavourable pavement performance. Surface distress can be broadly classified into the following groups.

Fractures:-

⇒ This could be in the form of cracking (in flexible and rigid pavement) or spalling resulting from such things as excessive loading, fatigue, thermal changes, moisture damage, slippage or contraction.

Distortion:-

⇒ This is in the form of deformation e.g. rutting, corrugation and shoving) which can result from such things as excessive loading, creep densification, consolidation.

Disintegration:-

⇒ This is in the form of stripping, raveling or spalling, which can result from such things as loss of bonding, chemical reactivity, traffic abrasion, aggregate degradation and binder aging.

ID = 7795 PAGE (6)

Q NO 6:-

ANS:- Alligator cracking:-

- ⇒ Known as map cracking or fatigue failure. Since it appears similar as alligator skin so it is called as alligator cracking.
- ⇒ The failure can be due to weakness in the surface base or subgrade; a surface or base that is too thin; poor drainage or the combination of all three.
- ⇒ The main reason of this type of failure is the repetitive application of heavy movement of traffic.

Block cracking:-

- ⇒ Block cracks look like large interconnected rectangles (roughly).
- ⇒ Generally it is caused by shrinkage of the asphalt pavement due to an inability of asphalt binder to expand and contract with temperature cycles.
- ⇒ This can be because the mix was mixed and placed too dry.
- ⇒ It spread over a large area of ground.

Longitudinal cracking:-

- ⇒ Longitudinal cracks are individual and run parallel to the centerline.
- This distress can be considered as either structural or an environmental distress.

ID = 7795 PASC (7)

⇒ These can be a result of both pavement fatigue, reflective cracking, or poor joint construction.

TRANSVERSE CRACKS:-

⇒ cracks perpendicular to the pavement centerline or laydown direction.

⇒ It is usually a type of thermal cracking.

⇒ Following are the causes of the transverse cracking.

⇒ The reflection of the crack or joint in an underlying pavement.