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Subject: → Highway and traffic Engineering

Semester: → 6th

Department: → Civil Engineer

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Date: → 15th April 2020

Exam: → Mid term exam

Q1: → Keeping in view different modes of transportation compare railways with Highways?

Ans: → Comparison between railways and Highways: →

• Railways

• Highways

i): → The transportation along the railways track ~~could~~ could be advantageous by railways between the stations both for the passengers and goods, particularly for long distance.

i): → A highway is any public or private road or other public way on land. It is used for major roads, but also includes other public roads and public tracks it is not an equivalent term to controlled-access highway, or a translation for autobahn, autoroute etc.

Railways

ii): \rightarrow It depend upon the road transport, i.e road could serve as a feeder system.

iii): \rightarrow Energy require to drag a unit load through unit distance by the railways is only $\frac{1}{4}$ to $\frac{1}{5}$ of that required by road.

iv): \rightarrow Safety (minimum crash rate if handled carefully else sever crash can occur)

v): \rightarrow Passenger and Goods

Highways

Page (2)

ii): \rightarrow Other modes are depend on it and It require small investment for the government.

iii): \rightarrow It gives maximum flexibility for travel with reference to route choice, direction, time and traveling speed.

iv): \rightarrow High degree of accident due to flexibility of movement.

v): \rightarrow Car, Bus, Truck etc.

Q2: → You are transportation engineer. You have been tasked to conduct office study as ~~pre~~ preliminary step for design of new highway. What reference material you ~~sh~~ will study and what data you will extract?

(R)
Ans: → For design of new highways first of all I will conduct office study as a preliminary step. The office study may include the following factors.

*): → Map Analysis: → In this step we will study in different aspects of map and will select roughly possible route for highway. In map analysis we also study topographic map which help us for selecting ~~poss~~ possible route for highway.

*): → Already Present Data: → In this step I will study all the data present in soft and hard form related to the area on which highway is to be constructed.

→ "Already present data" include engineering and non engineering aspects of the route.

→ It include soil behaviour, contours, land survey, temperature environmental aspects and population of peoples.

*): → Collected data after studies: →

→ My data collection will include following information.

• → Soil Behaviour of area.

• → Religious place or any other ~~low~~ important building.

• → ~~Geology~~ Geology of area.

• → Environment of area.

• → population of area.

• → Rivers and seas information.

• → Selected feasible route.

Q3: → what is importance of vehicle performance in highway design?

Ans: → Performance of road vehicles froms the highways.

→ Passing sight distance.

→ Setting speed limit.

→ Maximum grades.

→ Turnoff bays for buses.

→ Acceleration and deceleration lanes.

→ Timing of signalised intersection.

→ Highway alignment.

→ freeway ^{ramps.} ~~alignment.~~

→ length of acceleration.

Q4: → Write short note on Directional distribution in design of highways? Page (6)

Ans: → Directional distribution: → 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.

→ In the design of highways with more than two lanes and on two-lane roads where important intersections are encountered or where additional lanes are to be provided later, knowledge of the hourly traffic volume for each direction of travel is essential.

• Directional traffic is used for multilane roads and streets.

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

*) → Example: →

→ For example, consider a rural road with a design volume of 4,000 ~~veh~~ vehicles per hour (vph) for both directions of travel combined.

→ If during the design hour, the directional distribution is equally split, or 2000 vph in each direction, two lanes in each direction may be adequate.

→ If 80 percent of the DHV is in one direction, at least three lanes in each direction would be needed for the 3,200 vph. Page (7)

Q5: → Explain broad classification of surface distress modes?

⁽⁵⁾ Ans: → Surface distress modes are broadly classified into 3 groups.

i): → Fracture: →

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

ii): → 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, swelling or frost action.

iii) => Disintegration =>

→ This is in form of shipping raveling or spalling which can result from such things as loss of bonding, chemical reactivity traffic abrasion, aggregate degradation poor consolidation compaction or binder aging.

⇒ Surface distress is related to roughness (the more cracks, distortion and disintegration the rougher the pavement will be).

Q6: => Explain Alligator cracking, block cracking, longitudinal cracking and transverse cracking?

⁽⁶⁾ Ans: => Alligator cracking => → chicken-wire cracking: spider web cracking, map cracking etc.

→ Indicative of fatigue failure of pavement due to repeated traffic loads.

→ Alligator cracking may be considered a combination of fatigue and block cracking

→ It is a series of interconnected cracks of various stages of development.

→ Occurs in areas subjected to repeated traffic loadings. Page (9)

*): → Block Cracking: →

→ A pattern of cracks that divides the pavement into approximately rectangular pieces, with sides generally longer than one foot.

→ Rectangular blocks range in size from ~~up~~ approximately 0.1m^2 to 10m^2 .

→ Possible cause: shrinkage of asphalt

*): → Longitudinal Cracking: →

→ cracks predominantly parallel to pavement centerline. Location within the lane (wheel path versus non-wheel path) is significant.

→ Possible causes: →

→ Expansion and contraction of pavement material, roadbed settlement, poorly constructed paving joints.

*):→ Transverse cracking:→

centerline, not due to reflection cracking. → cracking across the

∴→ Possible causes:→

Expansion and contraction of
pavement material roadbed settlement,
poorly ~~construct~~ constructed paving joints.