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Section

"A"

Subject

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Q.No(1) :- Keeping in view different modes of transportation compare railways with highways.

Ans: Modes of Transportation:

The means by which passengers and freight achieve access and mobility between origin and destination. They are divided into three basic categories depending upon what medium is used to travel.

- ① Land (road, rail and pipelines)
- ② Water (Shipping)
- ③ Air (Aircrafts)

Waterways:- Ships, boats, submarine -- etc

Airways:- Aircraft, Helicopters and Hot-air balloon.

Railways:- Passenger and goods (Freight trains)

→ The transportation along the railways tracks could be advantageous by railways between the stations both for the passengers and goods particularly for long distance.

It depends upon the road transport i.e road could serve as a feeder system.

Energy require to drag a unit load through unit distance by the railway is only 1/4 to 1/5 of that required by road. Safety (minimum crash rate if handled carefully else sever crash can occur)

Highways:-

It provides door to door service. Other modes are depend on it.

- It saves the time for short distance
- It gives the maximum service to one end of
- It requires small investment for the government
- Motor vehicles are cheaper than other carries like rail engines
- High degree of accident due to flexibility of movement
- It gives maximum flexibility for travel with reference to route.

Q No (02) :: You are a Transportation Engineer. We have been tasked to conduct office study as a preliminary step for design of new highway. What reference material you will study and what data you will extract.

Ans

Office Study:

The following are the steps of office study.

Data Sources:

- We can collect data from National/ provincial departments, agriculture, geology, hydrology and mining)
- From maps
- From charts
- Aerial photographs

Data Examination:

The first phase in any highway location study is the examination of available data of the area in which

the road is to be constructed
 → This phase is usually carried out prior to any field or photogrammetric investigation

Area characteristics:

- Engineering, including topography, geology, climate, and traffic volumes.
- Social and demographic, including land use and zoning patterns.
- Economics, including unit costs for construction and the trend of agriculture, commercial, and industrial activities.

Preliminary analysis of the data:

- Will indicate any of the specific sites should be excluded from further consideration because of one or more of the above characteristics.
- For example: If it is found that a site of historic and archeological importance is located within an area being considered for possible route location, it may be immediately decided that any route that traverses that site should be excluded for further consideration.

Preliminary location survey:

- During this phase of the study, the position of the feasible routes are set as closely as possible by
- ① Establishing all the control points.
 - ② Determining preliminary vertical and horizontal alignments for each.

Economic Evaluation:

Economic evaluation of each

alternative route is carried out to determine the future effect of investing the resources necessary to construct the highway

Factor considered in economic evaluation

- Road user costs
- construction costs
- maintenance costs
- Road user benefits
- provide information on the economic resources that will be gained or lost if a particular location is selected.

Environmental Evaluation

- Highway construction at any location - significant impact on surroundings
- A highway an integral part of the local environment
- Environment includes plants, animals and human communities and encompasses social, physical, natural, and man-made variables

The above which we discuss from this we can collect data from this and we can also know about the reference material of the highway if we study the above material like earth, aggregates, environment etc.

QNO3: What is importance of vehicle performance in highway design?

Ans. The importance of vehicle performance in highway design.

"The acceleration and deceleration of the vehicle, or motor, bus etc are often critical parameters in determining highway design.

The design features are following

- Passing or climbing lanes
- Freeways ramp
- Acceleration and deceleration lanes
- Turnout bays for buses
- Determine the need for truck climbing lanes
- Highway alignment (passing and stopping sight distance)

QNO4. Write short note on Directional distribution in design of highways

Ans

Directional distribution:

The Directional Distribution may be define as highways must be designed to adequately serve the peak-hour traffic volume in the peak direction of flow

→ The total hourly traffic in both directions is used to design two lane roads

→ In the construction of highway with more than two lane and on two-lane roads where important intersections are encountered or where additional lanes are to be provided later, knowledge of

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% total traffic although occasionally 80% is observed.

Example :-

Consider a rural road with a design volume of 5,000 vehicles per hour (VPH) for both directions of travel combined.

QNO (5) :- Explain broad classification of surface distress modes.

Ans :-

Distress :-

Distress is a condition of the pavement structure that reduces serviceability or leads to a reduction in service life.

Classification :-

Surface distress mode can be broadly classified into the following three groups

Fracture :- This could be in the form of cracking or breaking, due to more load and fatigue thermal changes.

• Distortion: This is define as the deformation, which can result from such things as excessive loading, densification, consolidation or subgrade issues.

Disintegration:

This is in the form of stripping or revealing or removal of paving materials, which can result from such things as loss of bonding chemical reactivity, traffic abrasion, aggregate degradation or binder aging.

QNo 6: Explain Alligator cracking, block cracking, longitudinal cracking, and Transverse cracking.

Ans

Alligator cracking:

- crocodile cracking also called alligator cracking.
- Alligator cracking may be considered a combination of fatigue and block cracking.
- Occurs in areas subjected to repeated traffic loadings.
- Alligator cracking develops into a many-sided pattern that resembles cracked wire or alligator skin.
- It is a series of interconnected cracks of various stages of development.

Block crackings

→ The block cracking may be define as that the pavement divides into approximately rectangular pieces of sides longer than one foot.

→ Cause, shrinkage of asphalt

→ Rectangular blocks range in size from approximately $0.2m^2$ to $10m^2$

Longitudinal cracking:

The longitudinal cracking may be define as the cracking preclominantly parallel to pavement centreline, location within the lane (wheel path versus non-wheel path) is significant = possible causes.

Expansion and contraction of pavement materials, road bed settlement poorly constructed paving joints

Transverse cracking

This can be define as cracks perpendicular to the pavement's centerline or laydown direction

(D)

It is an unconnected crack that runs across a road pavement, perpendicular to the direction of the road

Cause. By the shrinkage of the asphalt layer or reflection from an existing crack