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Mid Exam

Highway and Transportation

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Q.No(i)

Keeping in view different modes of transportation compare railway with highway

ANSWER:

<u>RAILWAY</u>	<u>HIGHWAY</u>
1- Passangers and Goods (Freight train)	Car, Bus, Truck etc
2- It depend on road service	It provide door to door service
3- Energy required to drag unit load is $\frac{1}{5}$ of that required by road	Fuel consumption for unit load is high
4- Maximum safety i-e minimum crash rate	High degree of accident due to flexibility of movement.
5- It require high investment	It require small investment.
6- Rail is depended on road services.	Other modes depends on it.

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Q No 2

You are a transportation engineer. You have been tasked to conduct office study as a preliminary step for design of new highway. What reference material will you study and what will you extract from it?

ANSWER:

OFFICE STUDY OF EXISTING INFORMATION:

DATA EXAMINATION:

The first phase in any highway location study is examination of all available data of the area in which the road is to be constructed.

Reference material to be studied:

- Existing engineering reports
- Maps
- Aerial photographs
- Charts

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→ The type and amount of data collected and examined depend on the type of highway being constructed.

CHARACTERISTICS OF AREA:

- Engineering including, topography, geology, climate and traffic volumes.
- Social and demographic, including land uses and patterns.
- Economic, including unit cost for construction and the trend of agricultural, commercial, and industrial activities.

EXTRACTION OF DATA:

I will extract following data from it

- Any specific site should be excluded from further consideration

For example:

if it is found that a site of historic and archeological importance within an area

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being considered for possible route location.

Deforestation should be avoided.

Those route will be selected for which cost is minimum.

Routes which give facility to more people will be adopted.

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Q No 3

What is the importance of vehicle performance in highway design?

ANSWER:

Vehicle performance is important in highway design because

Acceleration and deceleration

Climbing or passing lane

Maximum grades

Freeway lamps

Setting speed limit

Adequate passing and stopping sight distance

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Q No 4

Write short note on Directional distribution in a design of highways

ANSWER:

Directional Distribution:

- Total hourly traffic in both direction is used to design two lane road.
- Highways must be design to adequately serve the Peak hour traffic volume in the Peak direction of flow.
- Directional traffic is used for multi lane roads and Streets
- Typically, one directional contributes by 55-70% in total traffic although occasionally 80% is observed.

Example:

Consider a rural road with design volume of 4000 vehicles per hour for both direction of travelling

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- If during the design hour, the directional distribution is equally split or 2000 VPH in one direction, two lanes in each direction may be adequate

- If 80% percent of DHV is in one direction at least three lanes in each direction would be needed for the vehicles

$$\underline{\underline{DDHV = AADT \times K (\text{Peak hour}) \times D (\text{Peak dir-flow})}}$$

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QNO 5

Explain broad classification of surface distress modes?

ANSWER:

Surface distress is "Any indication of poor or unfavorable pavement performance or sign of impending failure; any unsatisfactory performance of a pavement short failure"

Surface distress can be broadly classified into following three groups

i) Fracture

ii) Distortion

iii) Disintegration

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Q No 6

Explain the following

ANSWER:

ALLIGATOR CRACKING:

chicken wire cracking, spider web cracking, map cracking etc

- Alligator cracking may be considered a combination of fatigue and block cracking.

Occur in area subjected to repeated traffic loading.

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

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Block CRACKING

- A pattern of cracks that divide the pavement into approximately rectangular pieces with sides generally longer than one foot.
- Rectangular block range in size from approximately $0.1m^2$ to $1m^2$

Longitudinal Cracking:

- Possible causes:

Expansion and contraction of pavement material

Road bed settlement poorly constructed joints

Transverse Cracking:

Causes:

Slab longer than required

Excessive thermal stresses

Cures:

Crack Sealing

Dowel bar retrofit

Full depth rigid repair