"Mid term Exam"

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Semester :: 6th

Section :: A

Subject :: Highway & transportation

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Question / Answers

Q1 Keeping in view different modes of transportation Compare railway with Highway:-

Ans **Railways:-**

- The transportation along the railways track could be advantageous by railways between the Stations both for the passengers and goods particularly for long distance.

- It depend 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 that required by road.

- Safety (minimum crash rate if handled carefully else sever crash can occure).

Highways:-

- It gives the max service to one and all.
- It gives max flexibility for travel with reference to route. Choice direction, time & traveling Speed.
- It provide door to door Service.
- Other modes are depend on it.
- It requires small investment for the government.
- Motor vehicles are cheaper than other Carriers like rail engine
- It Saves the time for Short distance.
- High degree of accident due to Flexibility of movement.

Q2 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 you will Study & what data you will extract:-

Office Study:-

In this phase any highway location study is the examination of all available data of the area in which the road is to be Constructed.

Preliminary analysis of the data:-

In this phase all the available data is to be collected So it will indicate whether any of the Specific Sites should be excluded from further Consideration because of one or more of the above Characteristic.

For example:-

If it is found Some important that a Site of historic and archeological important is located within an area being Considered for possible route location, It may be Immediate decide that any route that traverses that Site should be excluded from further Consideration.

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.

Enviromental Evaluation:-

Highway Construction at any location. Significant impact on Surroundings. Envirsoment include plant, animals, & human Communities and encompasses Social, Phsical, natural & man made veriables.

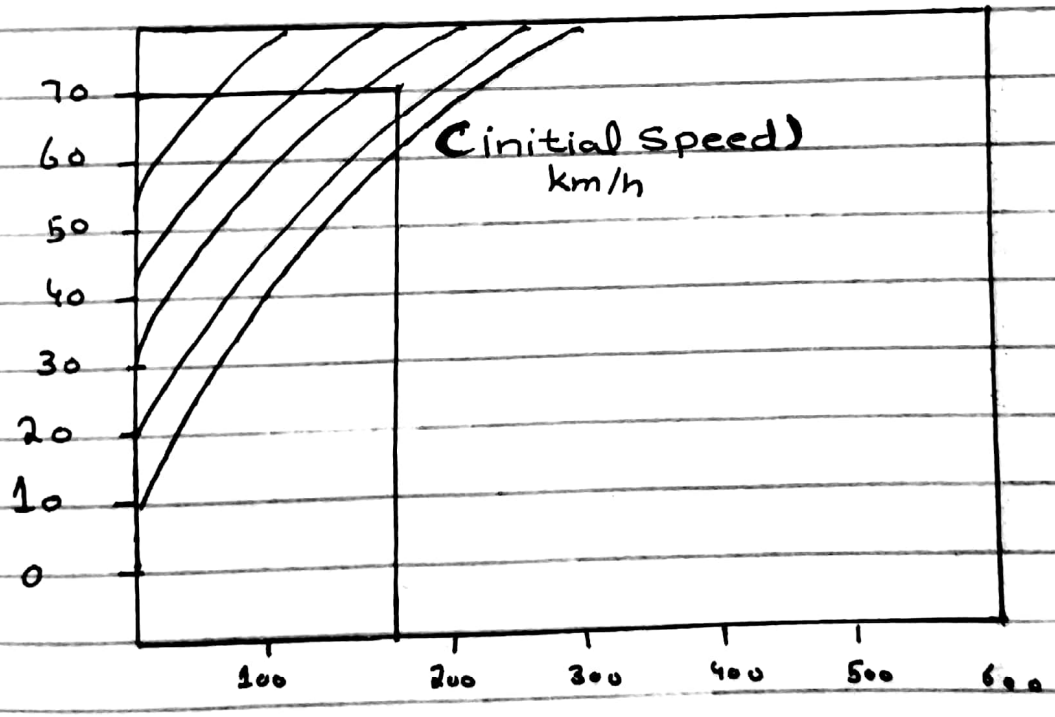
"At the Completion of this phase of the study, the engineer will be able to select general areas through which the highway can traverse".

Q3 What is importance of vehicle performance in highway design:-

Ans Acceleration & deacceleration rates of vehicles are often

Critical parameter in determining highway design.
These rates often govern the dimension of such design features.

- Free way ramps.
- Climbing or passing lanes.
- Turnout bays for buses.
- Acceleration & deceleration lanes.
- Highway alignment (adequate passing & Stopping Sight distance)
- Determine the need for truck climbing lanes (steep grade).



Y-axis = Speed Reached (Km/h)
x-axis = Passenger cars - Distance traveled.

Q4 Write Short note on Directional - distribution in design of highways:-

Ans Directional Distribution is the pre-dominant one-way traffic volume expressed as a percentage of two-way traffic.

⇒ In the design process of two or more than two-lane highway where important intersections are observed or where further lanes are to be provided in future, So Sufficient knowledge of the hourly traffic volume in each direction of travel is important.

⇒ 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 factors.

occasionally 80% is observed but typically one direction contributes 55 – 70% in total traffic.

For Example :-

If the directional distribution during the design hour equally splits or 20,000 Vph in one directions, two lanes in each direction may be adequate.

Q5 Explain Broad classification of Surface distress modes :-

Surface distress Modes :-

It is broadly classified into 3 broad groups.

(1) Fracture :-

It occure in the form of Cracking Ep breaking of pavement Surface.

⇒ The Reasons of fracture are :-

(i) Excessive loading

(ii) fatigue (cyclic loading)

(iii) Thermal expansion Ep contraction.

2) Distortion :-

Distortion occure in the form of deformation. Reasons are

(i) Excessive Loading

(ii) Weakness of base or Sub-grade layer

(iii) Densification

(3) Disintegration :-

The Breakup of a pavement into Small pieces is called Disintegration. It occure in the form of Stripping or removal of paving materials Such as aggregate etc.

The Reason Disintegration are :-

(i) Loss of Bonding b/w pavement.
(ii) Abrasion due to traffic.
(iii) Aggregate degradation
(iv) Chemical reactivity.

Q6 Explain Alligator cracking, Blocking Cracking, longitudinal cracking & Traverse 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 & block Cracking.

⇒ The Reason are :-

(i) load-related deterioration because of weak Subgrade
(ii) Too little pavement thickness.
(iii) Repeated traffic loading.

Block Cracking:-

It is a series of large rectangular blocks that appears in an asphalt pavement.

⇒ This type of cracking typically occure where there in no traffic.

⇒ The Reason for Block Cracking is the Shrinkage of asphalt pavement because of temp. cycle.

Longitudinal Cracking:-

These type of Cracking occure parallel to centerline of asphalt pavement.

⇒ These Reason are:-

(i) Poorly Constructed Joints
(ii) Improper Paver operations.
(iii) Expansion & contraction of Pavement material.

These Cracks are not load Rejected.

Traverse Cracking:-

These type of cracking occure perpendicular to the Centre line of asphalt pavement.

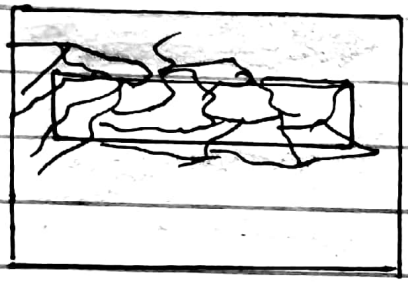
The reason are :-

(i) Shrinkge of Asphalt layer or reflection from an existing Cracks

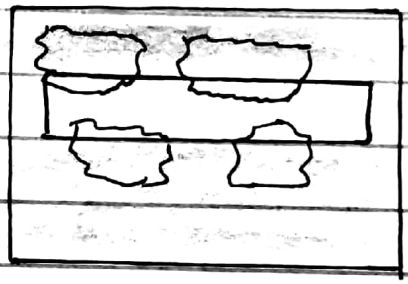
(ii) Poorly Constructed Joints

(iii) Poorly roadbed Settlement.

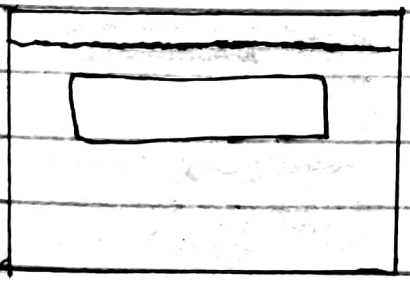
These Cracks are not load-related.



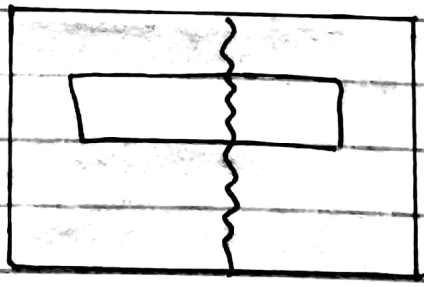
Alligator Cracking



Block Cracking



Longitudinal Cracking



Traverse Cracking