Malabar Polytechnic College Kottakkal
Maravattam, Kadampuzha, Malappuram Dist. Kerala
Approved by AICTE, New Delhi, Govt. of India - Affliated to State Board of Technical Education, Govt. of Kerala

DEPARTMENT OF CIVIL ENGINEERING

SEMESTER 5-2021 REVISION

5013-TRANSPORTATION ENGINEERING

QUESTION BANK

5013-TRANSPORTATION ENGINEERING

MODULE 1

Part A (1 mark)

1. **List any four NHs passing through Kerala.**
   Answer:
   NH-66 (formerly NH-17) - Panvel to Kanyakumari
   NH-544 (formerly NH-47) - Salem to Kochi
   NH-966 (formerly NH-49) - Kochi to Dhanushkodi
   NH-966A - Kundannoor to Willingdon Island
   NH-966D - Kochi to Vallarpadam
   NH-183: Kollam in Kerala to Dindigul in Tamil Nadu

2. **List any four SHs passing through Kerala.**
   Answer:
   SH-16 - Aluva – Munnar Highway
   SH – 24 – Kozhikode – Palakkad Highway
   SH – 28 – Valluvambram -Nilambur – Nadukani Highway
   SH – 71 – Tirur – Malappuram - Manjeri Road
   SH – 73 – Valanchery Nilambur Road

3. **List different types of roads as per IRC.**
   Answer:
   • National highways
   • State highways
   • Major district roads
   • Other district roads
   • Village roads

4. **Define Kerb.**
   Answer:
   They are road structures provided to indicate the boundary between pavement and shoulder or island or footpath or parking space.

5. **Define rotary.**
   Answer:
   It is an enlarged road intersection where all converging vehicles are forced to move round a large central island in one direction before they can weave out of traffic flow into their respective directions radiating from the central island.

6. **Define channelising islands.**
   Answer:
   Channelized islands use pavement markings or raised islands to designate the intended vehicle paths.

Part B (3 mark)

1. **Write about the major contributions of IRC in Indian Road Development**

   Answer:

   Contributions of IRC containing the following :

   • Standard specifications
   • Professional guidance in road engineering
   • 20-year road development plan
   • Recommendations on materials, design, and construction practice
   • Publish research journals
   • Highway Research Board
   • Motor vehicle act
   • Road classification

2. **Write the IRC classification of Road.**

   Answer:

   • National highways
   • State highways
   • Major district roads
   • Other district roads
   • Village roads

   National Highways: These are the important roads of the country. They connects state capitals, Ports and foreign highways. They also include military importance. They are financed by Central Government.

   State Highways: They are the important roads of a state. They connect important cities and district headquarters in the state, National highways and state highways of neighbouring states. They are financed by state Government.

   District Roads: These are roads within a district. They are financed by Zilapanishads with the help of grants given by state Government.

   a.) Major District Roads: They are roads connecting district headquarters, taluk headquarters and other important towns.
   b.) Other District Roads: They are district roads of less importance.

   Village Roads: They connect villages with each other and to the nearest district roads, highway, or railway. They are financed by Panchayats with the help of Zilapanishads and state Governments.

3. **Explain how you estimate the traffic volume in a highway project.**

   Answer:

   Traffic volume study methods:

   - Manual method –The field team manually count the classified volume for each turning movement for each period of time. If continuous 24 hours data count is not possible, data may be collected on sample basis. Usually tally method of data counting is adopted.
   - Mechanical counter methods - a mechanical counter automatically record total number of vehicles crossing a section of road in a desired period. Pneumatic hose placed across the road get attenuated when vehicles move over it. Lighter vehicles and pedestrians cannot be counted by this.

4. **What are the objectives of origin-destination studies?**

Answer:

This traffic study is conducted with regard to a CBD (Central Business District) of an urban or metropolitan area. It is conducted to detect the vehicle flow pattern. It will give an 'idea about the need for new roads and its alignment. The entry and exit of the vehicles to and from a CBD and the time spend by the vehicle inside the CBD is measured by a time punching card system or by an automated system, if there is digital number plate system. By this way we can trace the path traversed by the vehicle. Based on the OD new bye-pass is proposed at certain locations to avoid traffic congestion at certain location by diverting undesired traffic entering the CBD.

5. **Differentiate between at grade and grade separated intersections with one example.**

Answer:

At grade intersection- roads meeting at the same level. Physical interaction between vehicles will be present.

Any One example for at grade intersection is channelized, roundabout, rotaryetc.

Channelized intersection:

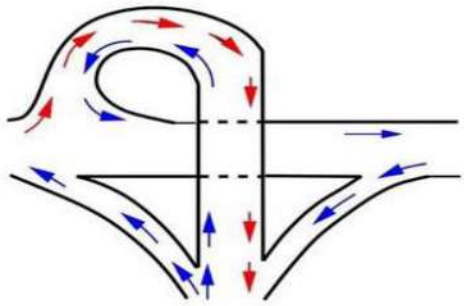
Vehicles approaching an intersection are directed to definite paths by islands, marking etc. and this method of control is called channelization.

- Channelized intersection provides more safety and efficiency.
- It reduces the number of possible conflicts by reducing the area of conflicts available in the carriageway.
- If no channelizing is provided the driver will have less tendency to reduce the speed while entering the intersection from the carriageway.
- The presence of traffic islands, markings etc. forces the driver to reduce the speed and becomes more cautious while manoeuvring the intersection.
- A channelizing island also serves as a refuge for pedestrians and makes pedestrian crossing safer.

Grade separated intersection — roads intersect at different levels. No physical interaction.

One example for grade separated intersection Trumpet interchange.

Trumpet interchange: Trumpet interchange is a popular form of three leg interchange. If one of the legs of the interchange meets a highway at some angle but does not cross it, then the interchange is called trumpet interchange. It contains three legs at the end, two of them are direct interchange ramps and another one is loop ramp which is a combination of semi-direct and indirect interchange ramps. A typical layout of trumpet interchange is shown in figure.



6. **Explain briefly about various types of roads structures - kerb, rotary and channelising islands.**

Answer:

Road structures

1. Kerb - They are root structures provided to indicate the boundary between pavement and shoulder or island or footpath or parking space. They are of three types.

Low or mountable type: allows the traffic to enter the shoulder are in case of emergency. The height is 10 cm above the pavement edge with a slope to help vehicle climb.
Semi-barrier type: is provided on periphery of a road way where pedestrian traffic is high. Height is 15 cm. In the case of acute emergency vehicle can climb on it with some difficulty.
Barrier type: is provided in built up area adjacent to footpaths with considerable pedestrian traffic. Height is 20 cm above the pavement edge with steep batter.

2. Rotary —

It is an enlarged road intersection where all converging vehicles are forced to move under a large central island in one direction before they can weave out of traffic flow into their respective directions radiating from the central island.
The main objects of providing a rotary are to eliminate the necessity of stopping even for crossing streams of vehicles and to reduce the area of conflict.

3. Channelizing islands -

Channelized islands use pavement markings or raised islands to designate the intended vehicle paths.

- Vehicles can be confined to definite paths.
- Conflict area can be minimized at an intersection.
- Refuge islands can be provided for pedestrians.
- It provides space for installation of traffic signs and signals.

7. Explain different types of traffic studies for a highway.

Answer:

A traffic study is a survey undertaken to determine the volume and/or nature of traffic utilising a particular route. A traffic survey can be manual or automatic information to be collected during traffic studies are:
1)Volume of traffic: It means number of vehicles, persons or animal passing a given point on a road during a specified period of time and is expressed as vehicles per day.
2) Speed Surveys: It is recorded by means of traffic counters.
3) Nature of traffic: It means whether the traffic is heavy during a certain period of the year due to some festival or harvest or during certain time with in the day when the office workers and come back.
4)Origin and destination of traffic: it means the places from where traffic originate and where if terminates.
5)Accidents: It mean collision of one road user with the other road user or with the fixed object lying with in the road pavement

8. Explain different types of road signals/signs.

Answer:

Road safety signs are:

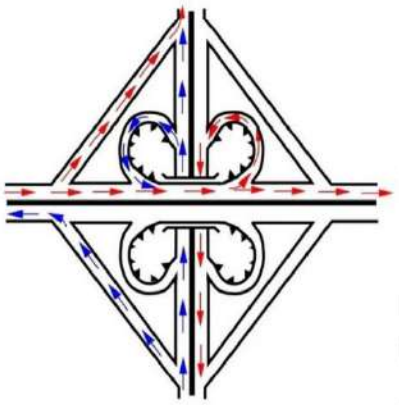
1. Mandatory Signs: These signs indicate to the traffic to comply with certain regulations of traffic. Violation of these signs is an offence, as per law. Halt, Stop, Go, Slow, Keep left etc.
2. Cautionary or warning Signs: These signs make the road users conscious of hazardous conditions on the road beforehand. The drivers, accordingly, take necessary actions to handle the situation. Junction, sharp bent, hill or ghat road, schools zone etc.
3. Informatory Signs: These signs guide the road users about destinations, distance, alternative routes, directional signs, and prominent locations like fuel points, public toilets, nearby hospitals, etc.
4) Prohibitory Signs: these signs indicate to the traffic that the use of horns is prohibited like no parking, no entry, speed limit etc

5) Temporary signs: these are signs which are used at the time of repairs.

9. **Explain with a neat sketch of clover leaf junction and mark the direction of vehicle movement.**

Answer:

Cloverleaf interchanges contain 4 legs and eight ramps. In each quadrant, one direct interchange ramp and one indirect interchange ramp is provided as shown in the figure. This type of interchange fulfils all the requirements for complete separation of traffic. Cloverleaf interchanges are used at intersections where two major highways cross each other.



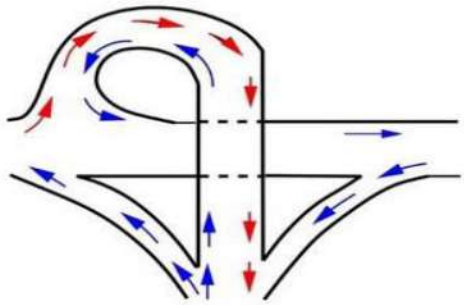
Full Cloverleaf interchange

Part C (7 mark)

1. **Write short note on grade separators. Sketch trumpet type grade separator.**

Answer:

- Grade separation is a method of aligning a junction of two or more surface transport axes at different heights so that they will not disrupt the traffic flow on other transit routes when they cross each other.
- The composition of such transport axes does not have to be uniform; it can consist of a mixture of roads, footpaths, railways, canals, or airport runways.
- Bridges (or overpasses or flyovers), tunnels (or underpasses), or a combination of both can be built at a junction to achieve the needed grade separation.
- It provides safety and reduces risk of accidents.
- Speed-limits for grade-separated roads are generally higher hence, high speeds can be maintained at intersections which results in saving of travel time.



2. **Define road alignment. What are the factors influencing by the selection of road alignment.**

Answer:

A highway alignment may be defined as a position occupied by the centerline of the road on the ground. Influencing factors are:

1.) The alignment should be as short as possible and as straight as possible between any two stations.
2.) It should connect as many places as possible.
3.) It should give easy gradients and smooth curves.
4.) Number of bridges and culverts should be less.
5.) It should cross a river at a place suitable for bridge site.
6.) As far as possible the alignment should be such that it comes on high ground ensuring a good natural drainage of water.
7.) It should avoid
   (a) Marshy Place
   (b) Marshy areas (Swamps & Poor Soils)
   (c) Religious places
   (d) Monuments of historical importance