

IAT-1

Answer Key

1 (a) What are the objectives of IRC and CRRI?

IRC

- Central semi official body known as IRC was formed in 1934.
- To provide national forum for regular pooling of experience and ideas on matters related to construction and maintenance of highways.
- It is a active body controlling the specification, standardization and recommendations on materials, design of roads and bridges.
- It publishes journals; research publications and standard codes specifications guide lines.
- To provide a platform for expression of professional opinion on matters relating to roads and road transport.

CRRI

- CRRI was formed in the year 1950 at New Delhi
- Engaged in carrying out research and development projects .
- design, construction and maintenance of roads and runways, traffic and
- transportation planning of mega and medium cities, management of roads in
- different terrains
- Improvement of marginal materials.
- Utilization of industrial waste in road construction.
- Landslide control .
- Ground improvements, environmental pollution
- Road traffic safety

(b) Briefly explain the classification of urban roads.

- Arterial roads: town to state highway or a national highway.
- Sub arterial roads: major roads they run within the limits of the town connecting its important centres
- Collector roads: for collecting the traffic from local streets to arterial streets
- Local street: These roads, also known as minor roads, are meant to provide approach to the buildings, officers, shops, schools, colleges etc.

2 (a) Write short note on:

(i) NHDP

National Highways Development Project (NHDP)

- NHDP's prime focus is on developing International standard roads with facilities for uninterrupted flow of traffic with :
 - Enhanced Safety Features
 - Better Riding Surface.
 - Better Road Geometry
 - Better Traffic Management and Noticeable Signage.
 - Divided Carriageways and Service Roads
 - Grade Separators , Over Bridges and Underpasses
 - Bypasses ,Wayside Amenities
- The Government of India has launched major initiatives to upgrade and strengthen National Highways through seven phases of National Highways Development Project (NHDP), the main components of NHDP are:
- **NHDP Phase I and II** Comprises of the development of National Highways to 4/6 lane standards of the following routes;
 - ❑ (a) Golden Quadrilateral (GQ) connecting 4 major metropolitan cities viz. Delhi-Mumbai-Chennai-Kolkata-Delhi
 - ❑ (b) North South and East West Corridors (NS-EW) connecting Srinagar to Kanyakumari and Silchar to Porbandar with a spur from Salem to Cochin.
 - ❑ (c) Road connectivity of major ports of the country to National Highways.
 - ❑ (d) Other National Highway stretches

(ii) KSHIP and its projects

KSHIP

- The works involved in the project are pavement design, highway design and design of structures, environmental and social impact evaluation of project.
- Implemented in different phases:
 - 1. Hoskote - Hindgnala cross; H cross – Chintamani bypass.
 - 2. Hangal – Tadasa; NH4 – Hangal
 - 3. Dharwad – Saundatti
 - 4. Thinthini – Chinchodi – Jalhalli – Karegud – Devadurga
 - 5. Chowdapur – Gulburga.
- Design life of the project is 20 years from the start of operation

(b) Explain the saturation system of road planning.

SATURATION SYSTEM :

Criteria for connecting roads are calculated for an area based on the concept of attaining maximum utility per unit length of the road. This is also called as **MAXIMUM UTILITY SYSTEM**

Factors to attain maximum utility per unit length are:

a) *Population served by the road network*

- Population less than 500, utility unit = 1
- 501 to 1001, utility unit = 2
- 1001 to 2000, utility unit = 3
- 2001 to 5000, utility unit = 4

3 (a) What are the main objectives of preliminary survey and list the steps followed in the preliminary survey by conventional approach?

Aim is to **finalize the most suitable alignment** out of various alternative alignments. All modern **survey equipments are used**.

It involves

- primary traversing
- Topographical features
- Levelling works
- Drainage studies and hydrology data
- Soil survey
- Material survey
- Traffic survey

viii. Determination of final centre line

Dr.Smaranika Panda

Methods to carryout preliminary survey:

- 1) Conventional approach
- 2) Rapid approach, by aerial survey taking the required aerial photographs and by photogrammetric method
- 3) Modern techniques by use of Global Positioning System (GPS)

(b) Briefly explain the reconnaissance survey in the alignment of a highway project.

- During reconnaissance survey, a general idea of a topography and other features, field identification of soils and survey of construction materials, by an on-the spot inspection of the site.
- To examine general characteristics of area with a view to select **possible alternative alignment**.
- During the reconnaissance, the engineer visits the site and examines the general characteristics of the area before deciding the most feasible routes for detailed studies

4 (a) Explain the steps involved in new highway project.

The various steps in a new highway project may be summarised as given below:

- **Map Study:** This is carried out with the help of available topographic maps of the area
- **Reconnaissance Survey:** During reconnaissance survey, a general idea of a topography and other features, field identification of soils and survey of construction materials, by an on-the spot inspection of the site.
- **Preliminary Survey:** Topographic details and soil survey along alternate alignments, consideration of geometric design and other requirements of alignment, preparation of plans and comparison of alternate routes; economic analysis and **selection of final alignment.**
- **Location of Final Alignment:** Transfer of the **alignment from the drawings to the ground** by driving pegs along the centre line of finally chosen alignment, setting out geometric design elements by location of tangent points, apex points, circular and transition curves, elevation of centre line and super elevation details.
- **Detailed Survey:** Survey of the highway construction work or the preparation of longitudinal and cross sections, computations of earth work quantities and other construction material and checking details of geometric design elements.

(b) Write short notes on camber.

Cross slope or camber is the slope provided to the road surface in the transverse direction to drain off the rain water from the road surface.

a) **Parabolic Camber**

$$y = x^2/a$$

where $a = nW/2$

b) **Straight Line Camber**

$$y = W/2n$$

W – width, n – cross slope in 1 in n

5 Four new road links A, B, C & D are to be constructed during a 5 year plan period. Suggest the order of priority for phasing the road construction based on maximum utility approach. Assume utility units of 0.5, 1.0, 2.0 & 4.0 for the population ranges and 2, 2 & 5 units per 1000 T of agricultural, raw material and industrial products from the following data.

Proposal	Total road length (Km)	No: of town & villages served with population range				Total agricultural products	Total Raw materials	Total industrial products		
		< 500	501-1000	1001-2000	>2000					
A	75	30*0.5	15*1	10*2	3*4	8000*2	3000*2	1000*5	1.186	IV
B	35	20*0.5	08*1	06*2	3*4	5000*2	1000*2	1600*5	1.628	II
C	40	15*0.5	06*1	05*2	5*4	6000*2	2000*2	3200*5	1.88	I
D	50	40*0.5	04*1	03*2	2*4	3000*2	7000*2	500*5	1.21	III