



# POSTAL BOOK PACKAGE 2024

## CONTENTS

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### CIVIL ENGINEERING

#### Objective Practice Sets

### Highway Engineering

1.	Highway Development and Planning .....	2
2.	Highway Geometric Design .....	7
3.	Traffic Engineering .....	33
4.	Highway Materials .....	51
5.	Pavement Design .....	60
6.	Highway Construction and Maintenance .....	75

# Highway Development and Planning

- Q.1** Indian Road Congress (I.R.C.) was founded and constituted with its headquarters at New Delhi, in  
 (a) 1924 (b) 1927  
 (c) 1930 (d) 1934

- Q.2** For administration of the movement of road transport, a Motor Vehicle Act was enacted in  
 (a) 1927 (b) 1934  
 (c) 1939 (d) 1947

- Q.3** As per the modified classification of road system by the Third Road Development Plan, 1981-2001, the roads in the country under 'Primary System' of road network consist of  
 (a) Expressways and National Highways  
 (b) State Highways (SH) and Major District Roads (MDR)  
 (c) Other District Roads (ODR) and Village Roads (VR)  
 (d) All of the above

- Q.4** Match **List-I** (Highway Survey) with **List-II** (Outcome) and select the correct answer using the code given below the Lists :

**List-I**

- A. Map study  
 B. Reconnaissance  
 C. Preliminary survey  
 D. Detailed survey

**List-II**

1. Best alignment of road  
 2. Grade line and central line of road  
 3. Cross-drainage locations  
 4. Obligatory points

**Codes:**

- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 1 | 2 | 4 | 3 |
| (b) | 4 | 3 | 1 | 2 |
| (c) | 1 | 3 | 4 | 2 |
| (d) | 4 | 2 | 1 | 3 |

- Q.5** Which one of the following is the chronological sequence in regard to road construction/design/development?

- (a) Telford, Tresaguet, CBR, Macadam  
 (b) Tresaguet, Telford, Macadam, CBR  
 (c) Macadam, CBR, Tresaguet, Telford  
 (d) Tresaguet, Macadam, Telford, CBR

- Q.6** Match **List-I** with **List-II** and select the correct answer by using the codes given below the lists:

**List-I**

- A. Central Road Fund  
 B. Indian Road Congress (IRC)  
 C. Motor Vehicles Act  
 D. Nagpur Road Conference

**List-II**

1. 1939  
 2. 1943  
 3. 1934  
 4. 1st March, 1929

**Codes:**

- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 4 | 3 | 1 | 2 |
| (b) | 1 | 4 | 2 | 3 |
| (c) | 2 | 3 | 4 | 1 |
| (d) | 1 | 2 | 3 | 4 |

- Q.7** Three new roads A, B and C are planned in a district. The data for these roads are given below:

Road	Length (km)	Number of Villages with Population		
		Less than 2000	2000-5000	More than 5000
A	20	8	6	1
B	28	19	8	4
C	12	7	5	2

Assume utility units, for population

< 2000 ⇒ 1

< 2000-5000 ⇒ 2

> 5000 ⇒ 3

The order of priority for these three roads should be

- (a) A, B, C                      (b) B, C, A  
(c) C, A, B                      (d) C, B, A

**Q.8** According to Nagpur Plan, Indian roads have been classified into how many categories?

- (a) 4                              (b) 5  
(c) 6                              (d) 7

**Q.9** The road length of National Highway by Third Road Plan Formulae, in a certain district in India having its area as 13,400 sq.m will be

- (a) 134 km                      (b) 268 km  
(c) 402 km                      (d) 10988 km

**Q.10** The area of a certain district in India is 15000 sq. km. and there are 10 towns in the district. According to Lucknow Road Plan, what will be length of NH and SH respectively?

- (a) 200 km and 325 km  
(b) 300 km and 325 km  
(c) 300 km and 600 km  
(d) None of these

**Q.11** The area of a certain district in India is 15000 sq. km. and there are 10 towns in the district. What will be the total length of Rural Roads (Tertiary system)?

- (a) 12900 km                      (b) 13200 km  
(c) 11900 km                      (d) 12800 km

**Q.12** Under the Nagpur Road Plan, which of the following are NOT relevant in planning the road development programme in a backward district?

1. Existing agriculture drainage network of drain canals.
  2. Existing number of Panchayat unions.
  3. Existing length of mud-track roads.
  4. Number of villages with population of 10000 and above.
- (a) 1, 2, 3 and 4                      (b) 1, 2 and 3 only  
(c) 1, 2 and 4 only                      (d) 2, 3 and 4 only

**Q.13** The length of National Highways as per 3rd 20 year (Lucknow) road plan is given by

- (a) area of the country/75  
(b) area of the country/50  
(c) area of the country/40  
(d) area of the country/25

**Q.14** Consider

1. Creation of Central Road Fund
2. National Highway Act
3. Formation of Indian Road Congress
4. Creation of Highway Research Board

The correct chronological order of these events is

- (a) 4, 3, 2, 1                      (b) 2, 1, 3, 4  
(c) 1, 3, 2, 4                      (d) 2, 3, 1, 4

**Q.15** In which one of the following location surveys of the road, soil profile sampling is done up to a depth of 1 m to 3 m below the existing ground level?

- (a) Preliminary survey  
(b) Final location survey  
(c) Construction survey  
(d) Material location survey

**Directions :** Each of the next items consists of two statements, one labelled as 'Statement (I)' and the other as 'Statement (II)'. Examine these two statements carefully and select the answers to these items using the codes given below:

**Codes:**

- (a) Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
(b) Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
(c) Statement (I) is true; but Statement (II) is false  
(d) Statement (I) is false; but Statement (II) is true

**Q.16 Statement (I):** Level grades may be used in fill sections for roads in rural areas.

**Statement (II):** On fill sections in rural areas, crowned pavements and sloping shoulders can take care of surface drainage.

**Q.17 Statement (I):** The 20-year road development plan of India does not take into consideration the length of railway network

**Statement (II):** Road development should be able to develop independently of the railway development.

**Answers Highway Development and Planning**

1. (d) 2. (c) 3. (a) 4. (b) 5. (b) 6. (a) 7. (d) 8. (b) 9. (d) 10. (c)  
11. (a) 12. (a) 13. (b) 14. (c) 15. (a) 16. (a) 17. (a)

**Explanations Highway Development and Planning****1. (d)**

A semi-official technical body known as Indian Roads Congress (IRC) was formed in 1934 at the instance of central government. It was the main recommendation of Jaykar Committee. IRC is now an active body of national importance, which controls specifications, standard and guidelines on materials, design and construction of roads and bridges.

**2. (c)**

Motor vehicle act enacted in 1939, which replaced the first such etc, 1914. It has been revised in 1988.

**3. (a)**

According to the Third Road Development Plan in the Lucknow plan (1981-2001), roads should be classified for India as follows:

- (i) Primary system - Expressways and National Highways.
- (ii) Secondary system - State Highways (SH) and Major District Roads (MDR)
- (iii) Tertiary system (Rural road) - other district roads and village roads.

**4. (b)**

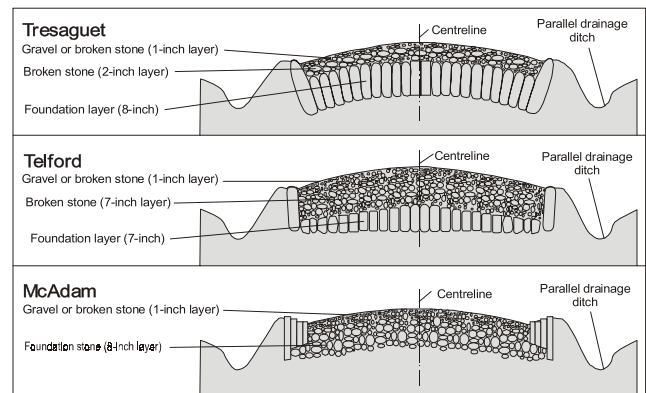
- Map study has to be conducted along obligatory points. Obligatory points are the points through which
  - (i) Alignment must pass.
  - (ii) Alignment should not pass.
- Reconnaissance involves visiting the site and examining the general characteristics of the area before deciding the most feasible routes for detailed studies. Details to be collected during Reconnaissance :
  - (i) Obstructions along the routes, e.g., valley, ponds, marshy land etc. which are not listed on map.
  - (ii) Approximate values of gradients.

(iii) Number and types of cross drainage structures, HFL and water table.

(iv) Construction material source and its availability.

(v) Soil type, its identification tests and details of geological formation.

Preliminary survey is done after the Reconnaissance to get the best alignment of road. Detailed survey involves establishing the grade line and centre line. Next step is to collect information necessary for preparation of plans and construction details for highway project.

**5. (b)**

Tresaguet construction was started in 1764 AD in France. Telford construction was started in 1803 AD in London (England). Macadam construction was started in 1815 AD in England. CBR construction was started in 1928 AD in USA.

**6. (a)**

- Central Road Fund was established in March 1, 1929.
- IRC was established in 1934.
- Motor Vehicles Act was established in the year 1939.
- Nagpur Road Conference happened in 1943.

7. (d)

Assuming utility units, for population

$$< 2000 = 1.0$$

$$< 2000 - 5000 = 2.0$$

$$> 5000 = 3.0$$

Utility per unit length,

For load

$$A = \frac{8 \times 1.0 + 6 \times 2 + 1 \times 3}{20} = 1.150 \quad \dots(iii)$$

For load

$$B = \frac{19 \times 1.0 + 8 \times 2.0 + 4 \times 3}{28} = 1.679 \quad \dots(ii)$$

For load

$$C = \frac{7 \times 1.0 + 5 \times 2.0 + 2 \times 3.0}{12} = 1.92 \quad \dots(i)$$

8. (b)

According to Nagpur Plan, Indian roads have been classified into 5 categories:

(i) National highways

(ii) State highways

(iii) Major district road

(iv) Other district road

(v) Village roads

9. (d)

As per 3<sup>rd</sup> 20 yr plan

Total length of road (km)

$$= \text{maximum} \begin{cases} 4.74 \times (\text{Number of towns} + \text{villages}) \\ \text{Road density} \times \text{Area} \end{cases}$$

We know that,

For 3<sup>rd</sup> 20 yr plan

$$\text{Road density} = 82 \text{ km}/100 \text{ km}^2$$

$$\text{Given, Area} = 13,400 \text{ sq. km}$$

$$\therefore \text{Total length of road} = \left( \frac{82 \times 13400}{100} \right) \\ = 10988 \text{ km}$$

10. (c)

$$\text{Length of NH, km} = \frac{15000}{50} = 300 \text{ km}$$

$$\text{Length of SH, km} = \frac{15000}{25} = 600 \text{ km} \quad \dots(i)$$

$$\text{Also length of SH, km} = 62.5 \times 10 - \frac{15000}{50} \\ = 325 \text{ km}$$

By total no. of towns and area in the state  
adopt length of SH (higher of the two) = 600 km

11. (a)

$$\text{NH} + \text{SH} + \text{MDR} + \text{ODR} + \text{VR} = 15000 \text{ km}$$

$$\left. \begin{aligned} \text{Length of MDR} &= \frac{15000}{12.5} = 1200 \text{ km} \\ \text{or} &= 90 \times 10 = 900 \text{ km} \end{aligned} \right\}$$

By no. of towns in the state,

adopt 1200 km

$$\text{NH} + \text{SH} + \text{MDR} = 300 + 600 + 1200 \text{ km} \\ = 2100 \text{ m}$$

Tertiary system or Rural Roads consists of ODR and VR.

$$\therefore \text{Length of Rural Road} = 15000 - (2100) \\ = 12900 \text{ km}$$

12. (a)

Nagpur road plan formula were prepared by radial or star and grid pattern. Villages with population of 501-5000 only were considered. Agricultural area and non agricultural areas were considered. There were no consideration mentioned for existing Panchayat union, existing mud track records or existing drainage network.

13. (b)

$$(i) \text{ Length of National Highways (NH)} \\ = \text{Area of the country}/50$$

$$(ii) \text{ Length of State Highways (SH)} \\ = \text{Area of the state}/25 \\ = 62.5 \times \text{number of towns in the state} \\ - \text{Area of the state}/50$$

$$(iii) \text{ Length of the Major District Roads (MDR)} \\ = \text{Area of the State}/12.5 \\ = 90 \times \text{number of towns in the state}$$

(iv) Total length of all categories of roads in a district i.e.

$$\text{NH} + \text{SH} + \text{MDR} + \text{ODR} + \text{VR} \\ = \text{Area of District} \times 0.82$$

14. (c)

The correct chronological order:

(i) Central Road Fund: 1929

(ii) IRC Formation : 1934

(iii) National Highway Act: 1956

(iv) Creation of Highway Research Board: 1973