

Highway Engineering (313323)

MSBTE Diploma · K-Scheme · Model Question Paper — Set A

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Use of non-programmable electronic pocket calculator is permissible.
7. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) Enlist the five categories of roads as per Nagpur Road Plan.
- b) Define camber. State the IRC recommended camber for high type bituminous surface and for WBM road in heavy rainfall area.
- c) Define Passenger Car Unit (PCU). Give the PCU values of any two vehicles as per IRC.
- d) Define landslide.
- e) State any four requirements of an ideal road alignment.
- f) Define: (i) Carriageway (ii) Formation width.
- g) State any four reasons why highway maintenance is necessary.

Q.2 Attempt any THREE of the following:**12**

- a) Enlist the different modes of transportation. State any four advantages of road transport.
- b) State any four factors affecting design speed. Write the IRC ruling design speed for NH and MDR in plain terrain.
- c) Draw a neat labelled cross-section of a National Highway in embankment showing carriageway, shoulders, formation width, side slopes, side drains and land width.
- d) Calculate the stopping sight distance for a design speed of 80 km/h on (i) a level road and (ii) a 3 % ascending gradient. Take reaction time 2.5 s and coefficient of friction 0.35.

Q.3 Attempt any THREE of the following:**12**

- a) Explain super-elevation with a neat sketch. State the maximum super-elevation recommended by IRC.

- b) Differentiate between flexible pavement and rigid pavement (any eight points).
- c) Describe the procedure of the softening point (ring and ball) test on bitumen with a neat sketch.
- d) State any four causes of landslides in hilly areas.

Q.4 Attempt any THREE of the following:

12

- a) Draw neat labelled sketches of expansion joint and contraction joint in cement concrete pavement.
- b) Explain rotary intersection with a neat sketch. State its two advantages.
- c) Explain any four failures of flexible pavement with neat sketches.
- d) Explain subsurface drainage of roads with neat sketches.
- e) Draw a neat cross-section of a hill road and label any six components.

Q.5 Attempt any TWO of the following:

12

- a) A two-lane road 7.0 m wide in plain terrain has a horizontal curve of radius 120 m. The design speed is 65 km/h. Design the super-elevation for mixed traffic taking coefficient of lateral friction 0.15. Also find the raising of the outer edge.
- b) Explain the different types of gradients. State the IRC values of ruling, limiting and exceptional gradients for different terrains.
- c) Explain with neat sketches: (i) types of horizontal curves (ii) types of vertical curves.

Q.6 Attempt any TWO of the following:

12

- a) Explain the step-by-step construction procedure of a WBM road with a neat sketch.
- b) Draw the following road signs: (i) STOP (ii) Give way (iii) No entry (iv) Speed limit 50 km/h (v) Narrow bridge (vi) Parking.
- c) Explain construction of cement concrete road by alternate bay method with a neat sketch. Compare it with continuous bay method.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in