

**B. CIVIL ENGINEERING (EVENING) 3RD YEAR 2ND SEMESTER EXAMINATION 2019
TRANSPORTATION ENGINEERING – I**

Time: 3 Hours

Full Marks: 100

(50 marks for each part)

Part I

Use Separate Answer scripts for each Part

Answer Question No 1 and any TWO questions from the rest

1. 15 + 10 + 5
- a. Explain the following by highlighting its significance in highway geometric design –
Shoulder of a highway; Minimum Longitudinal Gradient; PIEV Theory.
 - b. Write Short Notes on –
First Road Development Plan of India; Raised-up Islands on carriageway.
 - c. Justify the statement – Summit Curve does not require transition part but valley curve does

For Questions 2 to 4, consider a 4-lane 2-way undivided highway with design speed of 60Kmph, reaction time for braking as 2.5 secs, breaking efficiency as 90%, coefficient of breaking friction as 0.35, reaction time for overtaking as 2 secs and acceleration of overtaking as 3.6Kmph/sec. Any other required value, if not provided in the question may be assumed as standard.

2. Determine the desirable and minimum length of overtaking zone clearly explaining the different terms involved in the expressions used.
How and by how much this length of overtaking zone can be decreased by managing road cross section only? 6+2+2
3. Design the required super elevation, extra widening and transition length for a horizontal curve considering, average wheel base length of 5m, maximum permissible coefficient of lateral friction of 0.15 and maximum permissible super elevation of 7% provided by rotating about centre line at a rate of 1 in 125.
Also find the compensated grade, if the curve is situated at a positive gradient of 5% 8+2
4. At a particular portion ABC, AB with a negative gradient of 4% followed by BC with a positive gradient of 5% meets at B. Determine the type of the vertical curve suitable to connect the stretches AB and BC.
Design the minimum length of the curve required assuming overtaking not allowed in the curve.
Also find the location of the lowest/highest point of the curve, as the case may be, from the point A 1+7+2

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER - 2019

Subject: TRANSPORTATION ENGG. – I

Time: 3 Hours

Full Marks: 50

Part – II

Instructions: Use Separate Answer Scripts for each Part

No code or chart is allowed.

Answer Question no 3. Answer any one from 1 and 2.

1. a) Draw a cross section of permanent way and level all the components clearly. (5)
- b) Draw a neat sketch of a turnout and level different components clearly. (5)

OR

2. Explain the following terms in connection with rail defects: (3+4+3)
i) Rail wear, ii) Coning of Wheel, iii) Adzing of Sleepers
3. a) What are the different types of rails as per the shape? Which one is being used now-a-days and what are its relative advantages? Write down the necessities of uniform gauge. (2+4+4)
- b) What is the maximum value of super elevation to be provided in Indian Railway Track? What do you mean by negative super elevation and why is it necessary? (1+4)
- c) Derive Coles Method. Find out the expression for the cross-over length between two parallel tracks. (5+5)
- d) A 5° curve diverges out from a 3° curved main line in reverse direction of a B.G line. The maximum permissible speed on main line is 60 kmph. Calculate the negative super-elevation to be provided on branch line and the maximum permissible speed on branch line. (3+3)
- e) Calculate the number of sleepers required to construct a track of length 4 km on a BG route with sleeper density $(M+8)$. (3)
- f) Define Continuous Welded Rail (CWR), LWR and SWR. (3)
- g) Write down the requirements of an ideal rail section. (3)