

**B. CIVIL ENGINEERING (EVENING) 3RD YEAR 2ND SEMESTER EXAMINATION 2017
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

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| 1. Write short notes on the following – | 5 × 4 |
| a. Kerbs | |
| b. PIEV Theory | |
| c. Building Line & Control Line | |
| d. Longitudinal Gradients | |
| e. Classification of Non-Urban Highways | |
| 2. ABC is a 2-lane 2-way undivided highway where the longitudinal slopes of the AB and BC portion are (+) 1 in 40 and (-) 1 in 20 respectively. Fit a suitable vertical curve and find its lengths against valid design sight distances. Consider, Design speed = 80Kmph, reaction time for breaking = 2.5secs, coefficient of braking friction = 0.34, breaking efficiency = 90%, maximum speed of overtaken vehicle = 64Kmph, reaction time for overtaking = 2secs, acceleration of overtaking vehicle = 3.6Kmph/sec. | 15 |
| 3. For the same highway as specified in Qn (2) design a suitable horizontal curve with all components at a flat section of the highway with minimum longitudinal slope of 0.5%. Assuming the roadway, which is at 0.5m embankment constructed with side slope of 1(H):2(V) has 3m wide shoulder on both sides, find the minimum distance of building line from the centre line to provide unobstructed visibility for both sight distances. Consider, maximum super-elevation of 7% provided about centre line at a rate of 1 in 120; maximum coefficient of lateral friction = 0.15; and length of rigid wheel base = 6m | 15 |
| 4. a) Only one type of vertical curve needs transition length – Justify the statement. | 3 |
| b) Why is it essential to provide a minimum longitudinal gradient for every roadway? | 3 |
| c) What is the compensated grade when a 120m radius curve is to be set in a +4.5% grade? | 3 |
| d) Compare between the model parameters used in 1 st and 2 nd road development plan of India. | 6 |
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B.E. CIVIL ENGINEERING (PART TIME) THIRD YEAR SECOND SEMESTER - 2017**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 all questions.

- 1.(a) Write down the requirements of an ideal rail section. [4]
 (b) Calculate the number of sleepers required to construct a track of length 1 km on a BG route with sleeper density $(M+7)$ [3]
 (c) Draw a neat sketch of a turnout and level different components clearly. What is meant by heel divergence and what is its standard values for 1 in 8.5 and 1 in 12 turnouts. [7]
 (d) Show that $(CL \approx 2GN)$ by Coles Method in connection with turnout in railway track, where CL = curve lead and the other symbols have their usual meanings. Draw the necessary diagram to deduce the relationship. [6]
 (e) What do you mean by the term "Track Modulus"? What are the different types of track moduli and how are they defined? Write down the allowable value of it for 52 kg rail section in B.G track. [2+2+2]
2. (a) What are the different groups of railway routes found in India? Mention the speed potentials of those groups.
 (b) What do you mean by Pusher Gradient and mention a place where it can be found.
 (c) What are the different gauges found in Indian Railway Track? Discuss about the necessity of uniformity of gauge in P-Way
 (d) What is meant by "Adzing of Sleeper"? [4+2+4+2]
3. (a) Calculate the maximum permissible load that a B.G steam locomotive can haul with 4 pairs of driving wheels with axle load of 22 tonnes each on a straight level track at a speed of 90 Kmph.
 Also calculate the reduction in speed if the train has to run on a rising gradient of 1 in 150.
 What would be the further reduction of speed if the train has to negotiate a 4° curve on the rising gradient?
 [Assume coefficient of friction = 0.20] [3+2+2]
- (b) An 8° curve diverges out from a 3° curved main line in reverse direction of a B.G line. The maximum permissible speed on branch line is 30 kmph. Calculate the negative super-elevation to be provided on branch line and the maximum permissible speed on main line. [5]