. Civil Engg. 3rd YEAR 1st SEMESTER 2017
(1st /2nd Semester/Repeat/Supplementary /Spl. Supplementary /Old/Annual/Bi-Annual)
SUBJECT: TRANSPORTATION ENGINEERING-I
(Name in full)
PAPER -I
Time: ~~Two hours~~/ Three hours/~~Four hours/Six hours~~   Full Marks ~~30~~/100
(~~15~~/50 marks for each part)

Use a separate Answer-Script for each part

No. of Question	Part -I	Marks

* *Do not retain mobile phone in any form to avoid RA*
* *Maintain neatness.*
* *Assume reasonable data if it is not supplied.*
* *Answer any other two questions alongwith question no.1 (Qn no.1 is mandatory)*
* *All drawings-must be drawn by pencil*
* *No code etc. will be needed to answer the questions of this part*

(1)(a) How adzing of sleepers, tilting of rails and coning of wheels help to provide the thread of wheels in absolutely dead centre position on the head of the rails? Take the help of neat sketch if required.   **6**

(b) Give the "tree structured "classification of wears on rails. What measures may be adopted to minimize the wears on rails?   **3+6=9**

(c) Fill the blank cell/s in the table: **5**

Type of Gauge	Limit of super elevation (in cm)	Cant Deficiency (in cm)	Gauge width (in m)	Concerned rail length	Amount of grade compensation (IS recommendation)
B.G.					
M.G.					
N.G.				xxx	

(2)(a) Draw a sketch of cross section of a permanent way and label it's components.   **7**

(b) Discuss about the requirements of rails.   **8**

(3)(a) A 6° curve diverges from a 4° main curve in opposite direction in a layout of B. G. yard. If the speed on the branch line is limited to 24 kmph., determine the restricted speed on the main line.   **5**

(b) Explain the following terms with neat sketches of (any two):   **2×5=10**
(i) Ruling Gradient, (ii) Momentum Gradient, (iii) Pusher Gradient

(4)(a) Mention the relative merits and demerits of bull-headed rails (B.H. Rails).   **5**

(b) What will be the steepest gradient on a straight track when the following conditions exist, for a train having 16 wagons when   **6**
Weight of each wagon = 18 tonnes. Speed of the train = 60 kmph.
Rolling resistance of wagon = 2.5 kg/tonnes, Rolling resistance of locomotive = 3 kg/tonnes,
Weight of the locomotive = 120 tonnes,
Tractive effort of locomotive = 12 tonnes,

(c) What is rolling resistance? Explain it.   **4**

(5)(a) Why maintenance of railway track is needed?   **3**

(b) What are the main advantages, for which gradient is needed in the rail lines?   **3**

(c) What special measures should be taken for maintenance of high speed track?   **9**

(6)(a) Briefly explain the factors which are to be considered while selecting a site for an airport.   **10**

(b) For a country like India, which should be given more preference in your view (state with logic):   **5**
(a) much more expansion and spreading of Railway network, (b) opening of more airways root with increase in the number of aircrafts (for carrying people from one place to other place).

End of the Question

B. CIVIL ENGINEERING 3RD YEAR 1ST SEMESTER SUPPLEMENTARY EXAMINATION 2017
TRANSPORTATION ENGINEERING – I

Time: 3 Hours   Full Marks: 100

Part II   (50 marks)
Use Separate Answer scripts for each Part
Questions no. 1 is compulsory and any *two* from the rest.

1. Write short notes on the following –   4×5
   a. Exceptional Gradient & Grade Compensation
   b. Weaving Length & Weaving Angle
   c. Simple Diamond & Clover-Leaf Interchange (Diagrams with flow lines only)
   d. Skid
   e. Raised up islands on Roadway

2. a) From two trials, the flow and speed values of a highway along a single direction are obtained as 2000 PCU/Hr & 50KmpH and 4000 PCU/Hr & 25KmpH respectively. Considering Speed density model as Linear, Determine
   a. The mean free speed and average car length of the highway;   5
   b. The minimum number of lanes required in the highway to support a design traffic of 3000 PCU/hr for –
      i. Design Speed of 40 KmpH
      ii. Level of Service B considering limiting design speed and q/c ratio as $0.85 v_f$ and 0.2 respectively   6
   b) State the major changes of HCM 1985 from HCM 1950   4

3.   ABC is a part of a 2-lane 2-way divided highway, without any shoulder, where the portion AB with gradient of +2% is to be connected by a suitable vertical curve to the steep elevated portion BC, which has a slope of +5%. 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. Find the length of the suitable vertical curve connecting AB with BC and the position of the lowest / highest point of the curve, as the case may be, consider both sight distance conditions   15

4. a) State the significance of vehicular width, length, height, accelerating and braking on the geometric design of a highway.   10
   b) Find the safe radius and carriageway width for a rotary at the junction of 4 nos 4-lane 2-way approaches with uniform freeway design speed of approaches as 60KmpH. Consider coefficient of lateral friction varying linearly between 0.47 (for design speed of 20KmpH) to 0.43 (for design speed of 40KmpH)   5