

**B. E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER (Old) - 2018**  
**TRANSPORTATION ENGINEERING – I**

**Time: 3 Hours**

**Part I**

**Full Marks: 100**  
**(50 marks for each part)**

**Use Separate Answer scripts for each Part**  
**Answer ALL Questions**

1. Write short notes on the following – 3×5
  - a. Raised up islands on roadway
  - b. Criteria for selection of subsurface drainage filter
  - c. Weaving Length & Weaving Angle
  
2. Draw the conflict diagram of intersection of a 2-lane 2-way street with 1-lane 1-way street and mark different types of conflict 5
  
3. Draw a typical Clover-leaf Interchange at intersection of two 2-lane 2-way streets, clearly showing the grades of all approaches 5
  
4. A 4-lane 2-way divided highway with 3.0m wide shoulder on both sides runs along a plain terrain on 2.0m embankment with side slope of 1V:2H and 0.5m wide surface drain on both sides at the bottom of the embankment. The building line is at 5.0m from the outer edge of the drain and constructions exist from the building line. The other characteristics are as follows –  
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, maximum permissible superelevation = 7%, coefficient of lateral friction = 0.15, length of wheelbase = 5.0m, superelevation is provided at a rate of 1 in 120 about the centre line.  
For this highway design –
  - a. The safe horizontal curve with minimum radius. 15
  - b. Suitable vertical curve to connect a negative gradient 1 in 40 followed by a positive gradient 1 in 20. 10

**B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2018 (Old)**  
**(1st/2nd Semester/Repeat/Supplementary /Spl. Supplementary /Old/Annual/Bi-Annual)**

**SUBJECT: TRANSPORTATION ENGINEERING I**

(Name in full)

**PAPER xxxx**

**Time: ~~Two hours~~ / Three hours / ~~Four hours~~ / ~~Six hours~~**

**Full Marks 30/100**

(45/50 marks for each part)

Use a separate Answer-Script for each part

No. of  
Question

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Marks

Part - II

- *Maintain neatness.* ~~Do not write neatly in answer book~~
- *Assume reasonable data if it is not supplied.*
- *Answer any two questions.*
- All drawings-must be drawn by pencil
- No code etc. will be needed/ supplied to answer the questions of this part

(1)(a) Fill the blank cell/s in the table:

Type of Gauge	Gauge width (in m)	Concerned rail length (in m)
B.G.		
M.G.		
N.G.		xxx

- (b) What are the requirements of an ideal permanent way? 6
- (c) With the help of proper classification, categorize the various resisting forces which a locomotive has to encounter before starting a train and to keep it in motion. 4
- (d) Using a sleeper density of "M+5", find out the number of sleepers required for constructing a rail track 320m long. The track is B.G. track and is made up of welded rails (where two B.G. rails are welded together throughout 640m length). 4
- (e) Give the 'tree-structured presentation' of classification of sleepers. 2
- (f) Draw an ideal permanent way and label it properly. 7
- (2)(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) Explain in what respects a railway permanent track differs from a flexible major highway? 6
- (c) How does wear occur at end of rail? Explain your answer with a neat sketch. 4
- (d) Give the "tree structured "classification of wears on rails. What measures may be adopted to minimize the wears on rails? 3+6=9
- (3)(a) What special measures should be taken for maintenance of high speed track? 9
- (b) What will be the steepest gradient on a straight track when the following conditions exist, for a train having 18 wagons when  
 Weight of each wagon = 16 tonnes. Speed of the train = 60 kmph., Rolling resistance of locomotive = 3.0 kg/tonnes, Rolling resistance of wagon = 2.5 kg/tonnes, Weight of the locomotive = 120 tonnes, Tractive effort of locomotive = 12 tonnes,  
 Given, resistance depending upon the speed = 0.00008 wv, atmospheric resistance = 0.000006 wv<sup>2</sup> and resistance due to gradient = (w/g) where all notations stand for their conventional meanings. 6
- (c) Among concrete sleeper and metal sleeper which one is more preferable and why? 8
- (d) Why gradients are provided on tracks? 2
- (4)(a) For a country like India, which should be given more preference in your view (state with logic): (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). 5

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(Name in full)

**PAPER xxxx**

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Use a separate Answer-Script for each part

*Page 2 of 2*

- 4)(b) What are factors governing choice of gauge of a proposed railway track? 4
- (c) Match: 6
- |   |                              |
|---|------------------------------|
| (a) Centrifugal Force                     | (1) 0.65 to 0.90%            |
| (b) Carbon in Ordinary Rail               | (2) Overturning              |
| (c) Centripetal force                     | (3) On Gradients             |
| (d) Manganese in Ordinary Rail            | (4) Derailment               |
| (e) Wear of Rail on the basis of Location | (5) At the sides of the Head |
| (f) Wear of Rail on the basis of Position | (6) 0.55 to 0.68%            |
- (d) Determine the speed at which wagons with 14 tone axle load may be permitted to run on track with worn rails of  $I = 387.51 \text{ cm}^4$  and  $Z = 72.75 \text{ cm}^3$ . Take track modulus as  $53.5 \text{ kg/cm}^2$  and permissible stress with speed effect as  $23.7 \text{ kg/mm}^2$  4
- (e) Calculate the maximum permissible train load that can be pulled by a locomotive having four pairs of driving wheels; each pair carrying a load of 24 tonnes. The train has to run at a speed of 55 kmph on a MG curved track of  $5^\circ$  and having a gradient of 1 in 200. 6

**END**