Ref. No.: Ex/CE/T/321/2017 (Old)

B. E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER (Old) - 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 ALL Questions

1. Write short notes on the following – 5 × 4
   a. Kerbs
   b. Criteria for selection of subsurface drainage filter
   c. Weaving Length & Weaving Angle
   d. Building Line & Control Line
   e. Grade separated solution of the intersection when a 2-lane 2-way SH originates from a 2-lane 2-way NH clearly showing all flow paths and conflict points. (only figure to be drawn)

2. a) Determine the length of minimum overtaking zone for a 4-lane 2-way undivided highway with design speed of 80KmpH. State how this length can be further reduced without changing the design speed and determine what will be the length of overtaking zone in that case. For both cases, assume maximum speed of overtaken vehicle 64KmpH, reaction time for overtaking 2secs. acceleration of overtaking vehicle 3.6KmpH/sec. 8+2+2
   b) Find the compensated grade for a 200m radius horizontal curve in a longitudinal slope of 5%. 3

3. a) Name the different types of uses of bitumen in road construction.
   b) ABC is a 2-lane 2-way divided 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 length along with the position of the lowest / highest point of the curve, as the case may be. 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. 5+10

Form A: Paper-setting Blank

Ref No. Ex/CE/T/321/2017 (Old)

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2017 (Old)

(~~1st~~/2nd Semester/~~Repeat/Supplementary /Spl. Supplementary /Old/Annual/Bi-Annual~~)

SUBJECT: TRANSPORTATION ENGINEERING I

(Name in full)

PAPER ××××

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 | Marks

Part - II

- *Maintain neatness. Do not retain mobile to avoid RA.*
- *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) Explain in what respects a railway permanent track differs from a. flexible major highway? 6

(b) What is "gauge"? 2

(c) Using a sleeper density of "M+5", find out the number of sleepers required for constructing a rail track 640m 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

(d) What are the governing factors to fix the sleeper density? 2

(e) What is "wheel gauge"? 2

(f) Draw an ideal permanent way and label it properly. 7

(g) Give the 'tree-structured presentation' of classification of sleepers. 2

(2)(a) What is meant by the term - 'track modulus'? 3

(b) 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

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

(d) Why maintenance of railway track is needed? 3

(e) What are factors governing choice of gauge of a proposed railway track? 4

(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 16 wagons when
Weight of each wagon = 18 tonnes. Speed of the train = 60 kmph., 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 = $0.0000006\ wv^2$ and resistance due to gradient = (w/g) where all notations stand for their conventional meanings. 6

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

(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

(b) Among concrete sleeper and metal sleeper which one is more preferable and why? 8

(c) How followings play important roles for a good & safe rail permanent way: 3x2=6
(i) proper packing of ballast, (ii) high level integrity of ballast and (iii) minimum depth of ballast section?

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B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2017 (Old)

(~~1st~~/2nd Semester/~~Repeat/Supplementary /Spl. Supplementary /Old/Annual/Bi-Annual~~)

SUBJECT: TRANSPORTATION ENGINEERING I

(Name in full)

PAPER ××××

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

(4)(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 cm^4 and Z = 72.75 cm^3. Take track modulus as 53.5 kg/cm^2 and permissible stress with speed effect as 23.7 kg/mm^2 4

(e) What is gradient? 2

End of the Question