



INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR
Department: Civil Engineering
CE20103 Subject: Transportation Engineering
End Semester Examination (2015)

Full Marks: 50

No. of Students: 86

Instruction: Answer ALL Questions: Assume any data required suitably and state the same

PART-A

Question 1

- a) Define Capacity and Level of Service (LOS). (2)
- b) What are ruling and limiting gradients? What are the design consideration for crest and sag curves? (2+2)
- c) What is grade compensation and where should it be considered? (2)

Question: 2

- a) A roadway is being designed using a 65kmph design speed. One section of the roadway must go up and over a small hill with an entering grade of 5 percent and an exiting grade of 2.0 percent. How long must the vertical curve be and what type of curve it is? (3+1)
- b) What is uninterrupted flow? Explain Peak Hour Factor. Draw flow-density and speed-density diagrams. (1+1+2)
- c) A traffic stream displays average space headway of 25 m at 60km/h. Compute the density and rate of flow for this traffic stream. If the speeds measured over the stretch 39 km/hr and 48 km/hr and 55 km/hr, what is the Space Mean Speed? (2+1)

Question: 3

- a) Identify four different techniques using which you can collect traffic volume data. Explain which method will be suitable in collecting non-lane based traffic data that we experience in India. (2+1)
- b) What are the major data sources for travel demand forecasting? Identify four steps in urban transportation planning? Explain briefly. (1+2)

PART-B

Question-4

- a) Draw a phase diagram of bituminous mix; explain various volumetrics of bituminous mix and importance. Also comment on effect of bitumen (increase / decrease in bitumen content) on these volumetrics.
- b) Write down the step-by-step procedure to calculate vehicle damaged factor (VDF) from wheel load data.
- c) Three binder samples are labeled as: VG 10; PMB 40 and CRMB 50. What do you understand by these terms and numbers? Also write down the hardness of these binders in ascending order.
- d) What you do mean by API gravity of bitumen and how this value is useful? [3+2+2+2=9]

Question-5

- a) Explain the temperature susceptibility of bitumen in terms of penetration index (PI) value. Write down the equation for calculating PI value. Also mention the expected PI value of the bitumen useful for road construction.
- b) List out the three constituents of bitumen and write down significance of each one of them.

Transportation Engineering Question Paper

SJ Ball



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