Paper Code: ETCE-312	Subject: *Transportation Engineering-I*
Time: 3 Hours	Maximum Marks: 75

**Note: Attempt all questions as directed. Internal choice is indicated.
Assume missing data, if any.**

Q1 Answer the following:-   (5x5=25)
(a) Compare roadways and railways.
(b) What are the instruments required for reconnaissance survey, preliminary survey and detailed survey?
(c) Explain three classes of Kerbs.
(d) What is meant by bituminous concrete Premix treatment? What are its advantages?
(e) What are the objectives and features of traffic engineering? Explain with appropriate examples.

Q2 (a) What is the importance of Nagpur road planning of our country? Explain the plan formulae and the salient features of the plan. **(6)**
(b) Explain sight distance and factors causing restrictions to sight distance. Explain the significance of stopping, intermediate and overtaking sight distances. **(6.5)**

OR

Q3 (a) The speeds of overtaking and overtaken vehicle are 80 and 60 kmph respectively. if acceleration of the overtaking vehicle is 2.5 kmph per second, calculate the safe passing sight distance for the following conditions: **(6)**
(i) One-way traffic
(ii) Two-way traffic
(b) While aligning a high way in a built up area, it was necessary to provide a horizontal circular curve of radius 325 metre. The design speed is 65 kmph, length of wheel base of largest truck = 6.0 m and width of pavement is 10.5 m. Design the following geometric features: (i) Superelevation (ii) Extra widening of pavement (iii) Length of transition curve. **(6.5)**

Q4 (a) Explain and differentiate among spot speed, running speed, space-mean speed, time-mean speed, average speed and 98 percentile speed. **(6)**
(b) Explain and differentiate among the term capacity, possible capacity, practical capacity, 85 percentile speed, 15 percentile speed. **(6.5)**

OR

Q5 (a) Classify the different types of traffic signs and mention the general objective of each type of sign; with sketch. Also show the general shape of these types of signs. **(6)**
(b) The average normal flow of traffic on cross road 1 and 2 during design period are 440 and 280 PCU per hour respectively. The all-red time required for pedestrian crossing is 12 sec. Design two phase traffic signal with pedestrian crossing by Webster's method. **(6.5)**

[handwritten margin note: Saturated flow values on these roads are estimated as 1300 & 1100 PCU/hr.]

Q6 (a) Explain the principle of the various tests on road stones. Specify the desirable values of the test results. **(6)**
(b) Explain how the elastic modulii of subgrade and base course are estimated using plate bearing test data. **(6.5)**
P.T.O.

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OR

Q7 (a) Compute the radius of relative stiffness of 25 cm thick cement concrete slab using the following data;
Modulus of elasticity of cement concrete = 3×10^5 Kg/cm^2
Poisson's ratio for concrete = 0.15
Modulus of subgrade reaction, K=20kg/cm^3 **(6)**

(b) What are the applications of: (i) liquid limit (ii) plasticity index and (iii) free swell index of soils for highway construction works? **(6.5)**

Q8 (a) What are the causes of frequent failures in old flexible road pavements in India? **(6)**

(b) Explain the objectives, type of material and method of application of; **(6.5)**
(i) prime coat (ii) tack coat.

OR

Q9 (a) Write explanatory notes on (i) Penetration Macadam base (ii) Built-up spraygrout base. **(6)**

(b) Write brief notes on the following types of distresses in bituminous pavements: (i) Ravelling (ii) Rutting (iii) Corrugations (iv) Edge breaking (v) Aligator Cracks (vi) Shear failures (vii) Reflection Cracking. **(6.5)**

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