

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2131

Roll No.

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B.Tech.

(SEM. V) ODD SEMESTER THEORY

EXAMINATION 2013-14

TRANSPORTATION ENGINEERING – I

Time : 2 Hours

Total Marks : 50

Note :—Attempt all questions.

1. Attempt any **two** parts of the following : **(5×2=10)**
- (a) Explain briefly the role of the following in road development in India :
- (i) Jayakar Committee
- (ii) Nagpur Plan.
- (b) Discuss the main recommendations and road classification of Bombay Road Plan.
- (c) From the following observations, compute the length of national highways and secondary roads as per Nagpur Plan. Total area 10000 km², developed non agricultural area = 2850 km², Railway track length = 95 km. Population data is given below :

| Population | Number of towns or villages |
|------------|-----------------------------|
| < 500 | 605 |
| 501–1000 | 295 |
| 1001–2000 | 105 |
| 2001–5000 | 35 |
| > 5000 | 15 |

2. Attempt any two parts of the following : (5×2=10)

- (a) Discuss the cross sectional elements of roads considered for design. Draw a neat sketch of cross section of two lanes road with dual carriageway and median in rural area. Also indicate proper dimension of elements on sketch.
- (b) A two lane pavement of 7.0 m width on a NH in a rolling terrain has a curve of radius 65 m. The design speed is 45 km/hr. Determine the length of transition and circular curves.
- (c) A valley curve is formed by a descending gradient of 1 in 20 which meets an ascending gradient of 1 in 25 :
- (i) Design the total length of valley curve if the design speed is 80 KMPH so as to fulfill both comfort condition and head light sight distance for night driving, after calculating the SSD required.
 - (ii) Find the position of the lowest point of the valley curve to locate a under passing culvert.

3. Attempt any **two** parts of the following : (5×2=10)

- (a) List down the various methods for spot speed studies that are carried out. Discuss in detail any one of them. On the basis of data for spot studies given in **Table 1**, calculate upper and lower speed limit regulation as well as speed for design.

Table 1– Spot Speed Study Data

| Speed Range (KMPH) | Number of vehicles |
|--------------------|--------------------|
| 0-10 | 12 |
| 10-20 | 18 |
| 20-30 | 68 |
| 30-40 | 90 |
| 40-50 | 207 |
| 50-60 | 252 |
| 60-70 | 21 |
| 70-80 | 44 |
| 80-90 | 32 |
| 90-100 | 9 |

- (b) Explain the following terms :

- (i) Volume
- (ii) Density
- (iii) Space Mean Speed
- (iv) Passenger Car Units.

- (c) Explain the various types of traffic signs and their functions. Also draw the basic layout of type of regulatory and informative signs.

4. Attempt any **two** parts of the following : (10×2=20)

- (a) Calculate the stresses at interior, edge and corner of a cement concrete pavement using Westergaard stress equations, use the following data : Design wheel load = 5100 kg, pavement thickness $h = 20$ cm, modulus of elasticity concrete = 3×10^5 kg/cm², Poisson ratio of concrete is 0.15. Modulus of subgrade reaction $K = 6$ kg/cm³. Radius of contact area $a = 15$ cm.

- (b) Discuss the specification of course aggregate and binding materials required in WBM construction. Further explain how the following steps in WBM Construction are carried out :

- (i) Spreading of course aggregates
- (ii) Application of binding material.

- (c) Write short notes on any **two** of the following :

- (i) Bituminous Carpeting
- (ii) Asphaltic Concrete
- (iii) Surface Dressing.