



ELECTIVE - I
Highway, Projects Planning, Designing
& Economic Evaluation
(1051)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any five** questions.

1. Explain the importance of Nagpur road plan in highway planning of our country. Explain the plan formulae and the salient features of the plan. **20**
2. State the objects of widening of pavements on horizontal curves? What are the factors on which the design of widening depends? Explain. Also derive the expression for finding the extra widening required on horizontal curve. **20**
3. Explain summit and valley curve and the various cases when these are formed while two different gradients meet. Discuss the problems in highway valley curves and the best shape of a valley curve. **20**
4. a) Explain origin and destination study. What are the various uses of O & D studies ? **10**
b) Discuss briefly the various factors affecting the practical capacity of road. **10**
5. Explain group Index method of pavement design in detail. What are the limitations of this method ? **20**

6. a) Calculate the stresses at interior, edge and corner regions of cement concrete pavement using Westergaard's stress equation. **12**
 Use following data
 Wheel Load, $P = 41100 \text{ kg}$.
 Modulus of elasticity of cement concrete, $E = 3.0 \times 10^5 \text{ kg/cm}^2$
 Pavements thickness, $h = 15 \text{ cm}$.
 Poisson's ratio of concrete, $\mu = 0.15$.
 Modulus of subgrade reaction, $K = 3.0 \text{ kg/cm}^2$
 Radius of contact area, $a = 15 \text{ cm}$.
- b) State and explain the various steps involved in traffic accident studies. **8**
7. a) Explain the reinforcing of earth? Discuss the reinforcing of Earth with geosynthetics. **10**
- b) Discuss the internal and external stability of reinforced earth structures. **10**
8. Write short note on following **all**. **20**
- i) Central Road Fund.
- ii) Road transport taxation system in India.
- iii) Principles of highway economic analysis.
- iv) Flexible pavement.
