

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
IV B. Tech I Semester Advanced Supplementary Examinations March 2025

HIGHWAY ENGINEERING

(Open Elective)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Explain the necessity and objectives of highway planning. [7M]
b) Describe the various factors controlling the alignment of roads with neat sketches? [7M]
(OR)
2. a) Explain how master plan is prepared and the road development programme is phased. [7M]
b) Discuss the special care to be taken while aligning hill roads. [7M]

UNIT-II

3. a) Analyze various geometric elements to be considered in highway design? [7M]
b) Calculate the stopping sight distance for a design speed of 100 kmph. Take the total reaction time of 2.5 seconds and the coefficient of friction = 0.35. [7M]
(OR)
4. a) Explain total reaction time of driver and the factors on which it depends. [7M]
b) The deviation angle at a summit curve is 0.05 and the overtaking sight distance is 300m. find the length of summit curve required. [7M]

UNIT-III

5. a) Discuss the various traffic studies and their importance. [7M]
b) With neat sketches show various types of traffic signs. Classifying them in proper groups. [7M]
(OR)
6. a) Explain the relationship between speed, travel time, volume, density and capacity. [7M]
b) Enumerate the various types of intersections and the basic principles involved. [7M]

UNIT-IV

7. a) Explain briefly the principles of the various tests on road stones, specify the desirable values of the test results. [7M]
b) Explain briefly the Marshall method of design. [7M]
(OR)
8. a) Explain the tests performed on bitumen to assess are properties. [7M]
b) What is the Modulus of Sub-grade Reaction (k), and why is it important for pavement design? [7M]

UNIT-V

9. a) Explain the design factors that influence the design of pavements. [7M]
b) Compute the radius of relative stiffness of 15 cm thick cement concrete slab using the following data: modulus of elasticity of cement concrete= 2.1×10^5 kg/cm², poisons ratio of concrete = 0.15, modulus of sub-grade reaction, K=(a) 3.0 kg/cm² and (b) 7.5 kg/cm² [7M]

(OR)

10. a) Explain design considerations for rigid pavements, and how do they differ from flexible pavements. [7M]
- b) Design the tie bars along the longitudinal joints using the following data: allowable working stress in steel tie bars, $S_s = 1250 \text{ kg/cm}^2$, unit weight of CC $W = 2400 \text{ kg/cm}^3$, Maximum value of friction coefficient, $f = 1.5$, allowable tensile stress in deformed tie bars, $S_s = 2000 \text{ kg/cm}^2$, allowable bond stress in deformed bars, $S_b = 24.6 \text{ kg/cm}^2$ [7M]
