Code No: R2021015 **R20** SET - 1

II B. Tech I Semester Supplementary Examinations, July - 2022
HIGHWAY ENGINEERING
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

1 a) Discuss how social and economic development is linked to systematic and scientific road development. [7M]

b) Explain the salient features of the Nagpur Road Development plan and Bombay Road Development Plan. What are the main differences between the two plans? Discuss. [7M]

OR

2 a) Define highway alignment? List the requirements of good highway alignment? What factors influence the final alignment of a highway? Discuss with neat sketches. [7M]

b) Discuss the Salient features of the Nagpur Road Plan?Calculate the non-passing sight distance required on a highway with a design speed of100 kmph. Assume f = 0.42. The values of other quantities required may be assumed suitably. [7M]

3 a) With the help of a neat diagram indicating the various geometric elements of a traffic rotary, explain the design elements of a rotary intersection. [7M]

b) Calculate the safe stopping distance for a design speed of 60 kmph for (a) two-way traffic in a two-lanelevel road and (b) two-way traffic in a single-lane road. Assume the coefficient of friction as 0.37and the driver's reaction time as 2.5 sec. [7M]

OR

4 a) Define Superelevation. Derive an expression for computing the superelevation rate for a road section on a horizontal curve, analyzing the various forces acting on the vehicle moving. [7M]

b) Explain the factors that govern the length of sag and crest curves. [7M]

5 a) Define Traffic Volume, Speed, and Density. What are the units in which each of these parameters is measured? Explain. Explain their interrelationship. [7M]

b) Enumerate the various types of intersections and the basic principles involved? [7M]

OR

6 a) Explain the manual method of conducting traffic volume studies. [7M]

b) Discuss the need for grade-separated intersections, advantages, and limitations. [7M]

7 a) Why is it essential for a highway engineer to study soil behavior? What are the desirable properties of subgrade soil? [7M]

b) Discuss the importance of the Aggregate Impact value test? Mention these various limits for bases and subbases as per MoRTH, 2014 Specifications. [7M]

OR

8 a) Explain the CBR test procedure for field and laboratory tests. How are the results of the test obtained and interpreted? [7M]

b) What are the various test carried out on bitumen? Briefly mention the principle of any two tests and practical applications? [7M]

9 a) The rigid pavement is preferred over the flexible pavement. Justify your answer with suitable examples. [7M]

b) Explain the critical loading locations as regards wheel load stresses in cement concrete pavement. Discuss Westergaard's concept and assumptions? [7M]

OR

10 a) Explain the three regions of a pavement to be considered in the design of rigid pavements. Find the radius of relative stiffness and radius of resisting section for a concrete slab from the following data: [7M]

- Poisson's ratio of concrete = 0.15
- Modulus of elasticity of concrete = 2.5× 105 kg/cm^2
- The thickness of concrete slab = 16 cm
- Radius of loaded area = 12 cm
- Modulus of subgrade reaction K = 2.5 kg/cm^3

b) Enumerate the various methods of flexible pavement design. Briefly, indicate the basis of design in each case? [7M]