Code No: 185ER **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, January - 2025

TRANSPORTATION ENGINEERING

(Civil Engineering)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) Part- A for 10 marks, ii) Part - B for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of ten questions (numbered from 2 to 11) carrying 10 marks each. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a)	Explain the role of transportation in rural development in India.	[1]
b)	List various types of road patterns.	[1]
c)	Briefly discuss the importance of extra widening on horizontal curves.	[1]
d)	Briefly discuss the importance of Gradients for a highway facility.	[1]
e)	Describe condition diagram and collision diagram.	[1]
f)	What are the types of grade separated intersections?	[1]
g)	Explain the outcomes of spot test.	[1]
h)	What are the characteristics of visco-elastic materials?	[1]
i)	Explain mud pumping in rigid pavements.	[1]
j)	What is Overlay? List various types of Overlays.	[1]

PART - B

(50 Marks)

2.a) Explain the necessity and objects of highway planning.
b) Discuss general principles in the re-alignment of a highway and explain how it carried? [5+5]

OR

3.a) What are the uses of fact-finding surveys? How are these used and interpreted?
b) Explain with sketches the star and grid pattern. [5+5]

4.a) A rising gradient of 1 in 25 meets a falling gradient of 1 in 50 on a national highway. The minimum stopping sight distance is 150m. Design speed is 100km/hr, determine the length of summit curve and the distance of highest point from the starting of 1 in 25 gradient.
b) Find out the minimum length of transition curve required and the shift required to join the transition curve with circular curve of radius 200m, for a road passing through rolling terrain. Given design speed 65kmph, carriage way width 7.5m, rate of super elevation 1 in 150 and the road is rotated about the center line to achieve super elevation. [5+5]

OR

5.a) Explain the need for Transition Curves in the design of a horizontal curve.

b) Calculate the OSD required on a National Highway with a design speed of 100kmph. Consider the rate of acceleration as 1.75 kmph/sec and assume any other data required suitably. [5+5]

6.a) What are the different causes of traffic accidents? Explain various measures that may be taken to prevent accidents.

b) Explain the design considerations for a rotary. Discuss the advantages and limitations of a rotary intersection. [5+5]

OR

7.a) What are the purposes of channelization? What are the salient features of channelizing islands?

b) What are the advantages of signalized intersections? [5+5]

8.a) Explain in detail about the aggregate blending by Rothfuch's method, trial and error Procedure.

b) Explain the importance of stripping test and indicate the advantages and limitations of the test. [5+5]

OR

9.a) The load penetration values of CBR test conducted on two soil specimens of a particular soil are given below. Determine the average CBR value of the soil if 10 divisions of the load dial represents 20 kg load in the calibration chart of proving ring.

Penetration of plunger in mm	0	0.5	1	1.5	2	2.5	3	4	5	7.5	10	12.5
Load dial readings of specimen 1	0	10	18	26	34	40	50	62	70	87	95	109
Load dial readings of specimen 2	0	0.5	3.5	9	18	30	40	54	64	80	88	102

b) List the material used in cement concrete pavements and mention the specified tests. [5+5]

10.a) What is the radius of relative stiffness for a 20cm thick slab with $E = 3 \times 10^5$ kg/cm^2 and Poisson's ratio = 0.15, resting on a subgrade having modulus of 5kg/cm^3?

b) Elaborate on the factors to be considered when designing pavements. [5+5]

OR

11.a) How is the surface condition of flexible and rigid pavements evaluated? What are the categories of overlay combinations?

b) Calculate the spacing between contraction joints for a two lane 250mm thick concrete road having 3.5m wide slab. Unit weight of concrete = 24kN/m^3. Ultimate stress in tension = 0.16MPa. Coefficients of friction at interface = 1.5, and the factor of safety = 2. Also calculate the spacing between expansion joints, if the increase in temperature is 20^0C, the expansion joint gap is 24mm and the thermal coefficient = 10×10^{-6} per ^{o}C. [5+5]

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