Register No.:   ....   Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023
CIVIL ENGINEERING
(2020 SCHEME)

Course Code :   20CET206

Course Name: Transportation Engineering

Max. Marks :   100   **Duration: 3 Hours**

Assume missing data
IRC 37-2018 is permitted
Use figures for explanation wherever necessary

PART A
(Answer all questions. Each question carries 3 marks)

1. Elucidate the different types of kerbs using sketches.

2. Classify summit curve & valley curves.

3. Explain Equivalent Wheel Load Factor (EWLF) with the help of an example.

4. Interpret the concept of effective CBR as per latest IRC guidelines.

5. Distinguish between Basic & Practical capacity and write the factors affecting Practical capacity.

6. Define the term "Thirtieth highest hourly volume".

7. If the ruling gradient is 1 in 200 on a particular section of a Meter-gauge track and at the same time a curve of 3 degree is situated on this gradient. Calculate the allowable ruling gradient.

8. List the requirements of a good harbour.

9. Differentiate Holding apron and loading apron.

10. "All aircraft operation should be conducted against the wind". State the reasons.

PART B
(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) A National Highway passing through a rolling terrain in heavy rainfall area has horizontal curve of radius equal to 260m. Take allowable rate of introduction of super elevation as 1 in 150. Calculate (i) length of transition curve (ii) shift of transition curve.   (10)

    b) Illustrate the cross section of a road in cutting and mark its elements.   (4)

OR

12. a) Derive the equation for Overtaking Sight distance on a two-way road with the help of neat sketches. Mention the significance of Intermediate Sight distance.   (10)

    b) Explain the methods of providing super elevation on roads.   (4)

MODULE II

13. a) List out the desirable properties of bitumen. Write the procedure to test ductility and softening point of bitumen.   (8)

    b) Illustrate sectional view of a typical flexible and rigid pavement and label the different layers. Comment the nature of load distribution on both the pavements.   (6)

OR

14. a) Describe the specifications of materials and construction steps of Wet Mix Macadam (WMM).   (7)

    b) (i) Design a flexible pavement for a two- lane undivided road using the following data:

      Design CBR of subgrade = 5%
      Construction period = 3 years
      Design life of pavement = 15 years
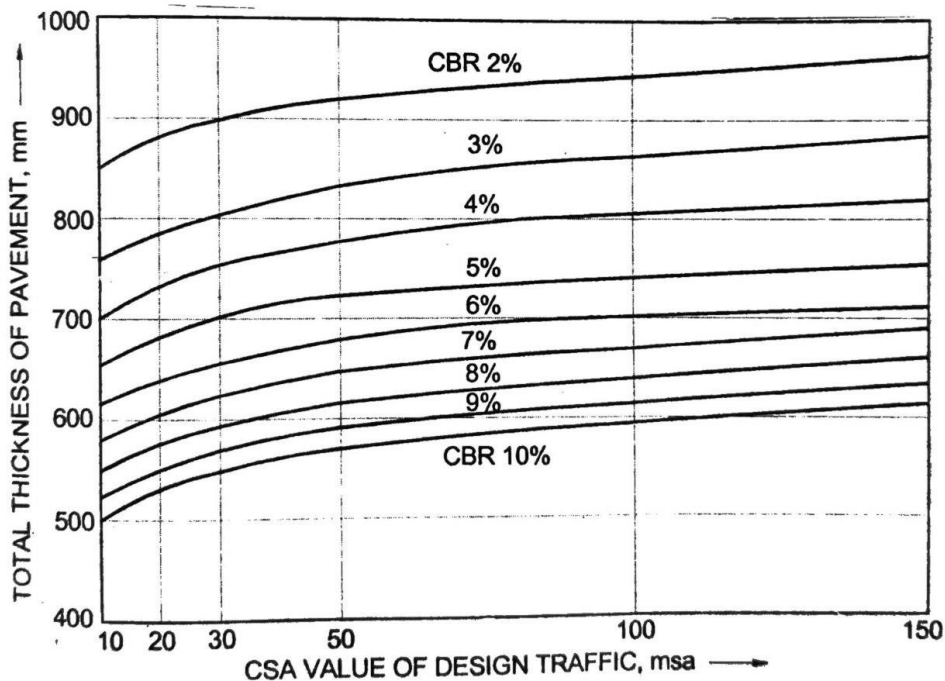   Number of commercial vehicles as per last count = 450cvpd
      Average Vehicle Damage Factor = 3.5
      Lane distribution factor = 0.75
      Average growth rate = 7.5%   (7)

(ii) Enumerate the limitations of CBR method of Pavement design

MODULE III

15. a) Derive the fundamental equation of traffic flow and explain the parameters.   (5)

      b) The table below shows data of spot speed study conducted on a stretch of highway. Using graphs, determine (i) Geometric design speed (ii) Upper speed limit and Lower speed limit.   (9)

Speed range (Kmph)	Vehicle count
16-20	3
21-25	7
26-30	19
31-35	24
36-40	20
41-45	18
46-50	15
51-55	14
56-60	9
61-65	5
66-70	4
71-75	2

OR

16. a) Explain any four types of grade-separated intersections with neat sketches   (10)

      b) Prepare a sample questionnaire for Origin and destination survey by Road-side interview method.   (4)

MODULE IV

17. a) Differentiate harbour and ports. Explain the various classifications of harbour based on protection needed and utility.   (6)

      b) Explain the steps in setting out of a tunnel with the help of neat sketches.   (8)

OR

18. a) Enlist the factors affecting selection of rail gauge. Why uniformity of gauges is necessary?   (6)

      b) Describe the operation of a floating dry dock and graving dry dock. List out the advantages of floating dry dock over graving dry dock.   (8)

MODULE V

19.   a)   The mean of average daily temperature and the mean of maximum daily temperature for the hottest month of the year at a proposed airport site (150m above MSL) is 42°C and 48°C respectively. The basic length of the runway is 1200m. Calculate the actual length of runway.   (10)

End to End of runway(m)	Gradient (%)
0-200	+1.25
200-600	-1.00
600-1200	+0.50
1200-1600	+0.20

    b)   Write the factors governing the layout of taxiways.   (4)

OR

20.   Explain Normal landing, normal takeoff and engine failure case with neat sketches.   (14)

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