

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023**

Semester : Semester IV - 2021

Course Code : CIV2016

Course Name : Sem IV - CIV2016 - Transportation Engineering

Program : CIV

Date : 14-JUN-2023

Time : 9.30AM - 12.30PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(5 X 4 = 20M)

1. Explain briefly the purpose of the following components of Railway track:
(i) Sleeper (ii) Ballast (iii) Subgrade (iv) Rail
(CO3) [Knowledge]
2. Calculate the number of sleepers required for 1 km railway track, if sleeper density is $(n + 4)$ for broad gauge and the length of one rail for a broad gauge is 13 m.
(CO3) [Knowledge]
3. A national highway passing through rolling terrain in heavy rain fall area has a horizontal curve of radius 500 m.
 - Design the length of transition curve using the following data:
 - Design speed of vehicle= 80 kmph
 - Allowable rate of superelevation= 1 in 150
 - Pavement rotated about the inner edge of the payment.
 - Pavement width excluding extra widening= 7 m.(CO2) [Knowledge]

4. An airport has 4 gates which are available for all the aircraft. It serves three classes of aircraft having mix and average occupancy time during peak hour as follows:

Aircraft Class	Mix (%)	Average Occupancy Time in Minutes
1	40	65
2	35	50
3	25	40

If the maximum gate utilization factor is 60%, determine the capacity of the gates at this airport to process the aircraft.
(CO3) [Knowledge]

5. List and briefly explain any two factors controlling the alignment of a highway.
(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(5 X 10 = 50M)

6. The recent Balasore train accident has brought back the focus of rail safety in India. As per statistics, 55% of railway accidents in India had occurred due to negligence or failure of the Railways staff and 6% had occurred due to equipment failure. In this context, discuss the various causes of rail failure.
(CO3) [Comprehension]
7. Sketch the overtaking zone for a two-lane divided pavement with a design speed of 60kmph. What will be the increase in the overtaking sight distance, if the road was an undivided lane. Also, determine the desired length of overtaking zone to be provided and sketch the overtaking zone.
The acceleration during overtaking may be assumed to be 0.85 m/s^2
(CO2) [Comprehension]
8. Strength, Hardness and Toughness are important properties for aggregates to be use in road. Identify and explain the tests to be carreid out for determining these properties.
(CO2) [Comprehension]
9. Design a summit curve for a road where an ascending grade of 1 in 120 meets a descending grade of 1 in 100. The curve is to provide for SSD of 250m and OSD of 470m.
(CO2) [Comprehension]
10. Basic runway length is the length of the runway given under standard environmental and topographical conditions. The actual runway length will be determined after applying the corrections over the basic runway length. List and briefly discuss about the corrections to be applied for basic runway length. Also, calculate the actual runway length to be provided for the given data:
- Airport elevation (RL) = 120m
 - Airport reference temperature: 30°C
 - Basic runway length = 750m
 - RL of Highest point along the length of runway = 99.5 m
 - RL of Lowest point along the length of runway = 96.0 m

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 15 = 30M)

11. a) Discuss about the requirements of a good Track. (8M)
b) List and discuss any 03 factors to be considered while orienting a runway. (7M)
(CO3) [Application]
12. Determine the superelevation required for a horizontal curve of radius 200m and design speed of 80kmph. Also, calculate the extra widening required at the curve if the width of pavement is 7.5m and the longest wheel base of the vehicle expected on the road is 7m. If this road is on a ruling gradient of 6%, determine the compensated gradient at the curve.

(CO2) [Application]