These problems address topics from the NCEES FE Civil CBT Exam Specifications at https://ncees.org/wp-content/uploads/FE-Civil-CBT-specs-1.pdf, see below.

YouTube Playlist

FE Civil Review 2022

Transportation Engineering

NCEES Fundamentals of Engineering (FE)
CIVIL CBT Exam Specifications

Effective Beginning with the July 2020 Examinations

Knowledge	Number of Questions
13. Transportation Engineering	**9–14**

A. Geometric design (e.g., streets, highways, intersections)
B. Pavement system design (e.g., thickness, subgrade, drainage, rehabilitation)
C. Traffic capacity and flow theory
D. Traffic control devices
E. Transportation planning (e.g., travel forecast modeling, safety, trip generation)

Notes
V1.0 published 3/29/2022
V1.1 minor correction to problem 14 3/30/2022

A. Geometric design

Question 1: A circular horizontal curve has a deflection angle of 39° between two tangents and a radius of 600 ft. What is the length of the curve?

A. 378 ft

B. 408 ft

C. 466 ft

D. 534 ft

A. Geometric design

Question 2: A circular horizontal curve has a degree of curvature of 11° and a horizontal line of sight from PC to PT of 600 ft. What is the deflection angle between the two tangents that make up this curve?

A. 58°

B. 62°

C. 66°

D. 70°

A. Geometric design

Question 3: A circular horizontal curve has an intersection angle of 41°, a radius of 600 ft and a PI of 8+00. What is the station of the PC?

A. 2+25

B. 5+00

C. 5+76

D. 6+00

A. Geometric design

Question 4: Given a parabolic vertical curve with VPC station of 14+44 at elevation 792 ft, an entry grade of 2%, an exit grade of -3%, and length of 600 ft, the elevation of the point of vertical tangency is most nearly:

A. 786 ft

B. 789 ft

C. 795 ft

D. 804 ft

A. Geometric design

Question 5: A parabolic vertical curve on a roadway with a design speed of 75 mph has an entry grade of 7% and an exit grade of -5%. AASHTO standard driver reaction time is assumed to be 2.5 s and deceleration of 11.2 ft/sec^2. For this curve, stopping distance criteria is based on the most restrictive slope. The minimum length of vertical curve that must be provided for these grades and stopping distance is most nearly:

A. 900 ft

B. 2200 ft

C. 3100 ft

D. 4600 ft

B. Pavement system design

Question 6: The pavement design for a highway segment is constructed with the following lifts and material properties.

Lift	Material	Thickness (in)	Layer Coefficient (in^{-1})
Pavement	Asphalt Concrete	9”	0.44
Aggregate Base	Crushed Stone	8”	0.14
Subbase	Crusher Run Gravel	12”	0.10

The Structural Number for this pavement section is most nearly:

A. 5

B. 6

C. 7

D. 8

C. Traffic capacity and flow theory

Question 7: The counts below were taken on a major arterial during the morning peak period.

Time Period Start	Time Period End	Volume (vehs)
7:00 AM	7:15 AM	455
7:15 AM	7:30 AM	658
7:30 AM	7:45 AM	708
7:45 AM	8:00 AM	728
8:00 AM	8:15 AM	765
8:15 AM	8:30 AM	744
8:30 AM	8:45 AM	712
8:45 AM	9:00 AM	618

Based on these data, the peak hour factor is most nearly:

A. 0.95

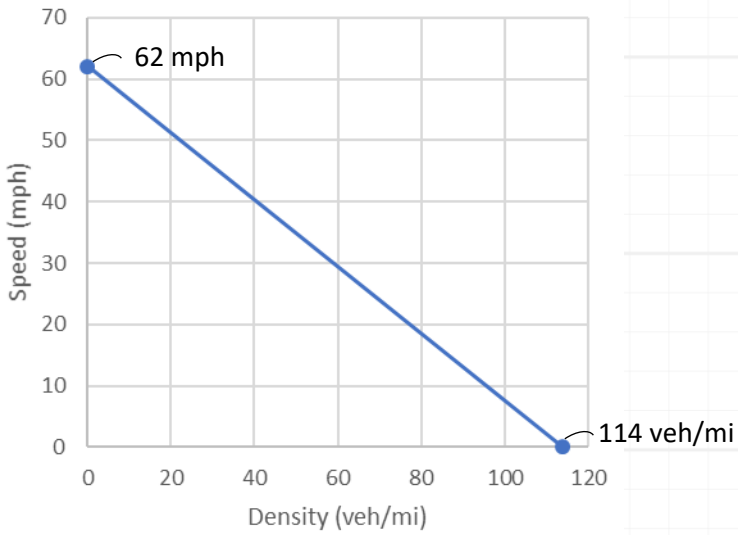
B. 0.96

C. 0.97

D. 0.98

C. Traffic capacity and flow theory

Question 8: A plot of the mean vehicle speed versus the traffic density for a road segment is shown below.



The maximum flow for this road segment is most nearly:

A. 1500 veh/hr

B. 1600 veh/hr

C. 1700 veh/hr

D. 1800 veh/hr

C. Traffic capacity and flow theory

Question 9: A six-lane freeway has an average lane width of 11 ft, and right-side lateral clearance of 2 ft. A 2-mile stretch of freeway has 5 ramps. The FFS for this segment is most nearly:

A. 60 mph

B. 65 mph

C. 70 mph

D. 75 mph

C. Traffic capacity and flow theory

Question 10: A six-lane freeway has a peak-hour, peak-volume of 2400 veh/h in each direction with a peak hour factor of 0.96 and free flow speed of 60 mph. The freeway is in rolling terrain, is used by regular users and is 4% truck traffic. The LOS of this segment is most nearly:

A. LOS A

B. LOS B

C. LOS C

D. LOS D

D. Traffic control devices

Question 11: A vehicle approaches a traffic signal that is green. Which of the following is typically true:

A. It is illegal for the vehicle to enter the intersection if the light turns yellow.
B. It is illegal for the vehicle to be in the intersection if the light is red at any time.
C. It is legal for the vehicle to enter the intersection if the light is yellow.
D. It is legal for the vehicle to enter the intersection only if the light is green.

D. Traffic control devices

Question 12: A vehicle approaches a traffic signal on a 2% upgrade at a speed of 25 mph. Using a standard reaction time of 1.0s for intersections and the standard AASHTO deceleration rate of 11.2 ft/s^2, the minimum time allowable for the yellow signal is most nearly:

A. 2.06 sec

B. 2.55 sec

C. 2.98 sec

D. 3.45 sec

E. Transportation planning

Question 13: A base peak hour design traffic of 2498 vehicles per hour is measured for a given road segment. Traffic is expected to grow by 2.5% per year. The estimated base peak hour traffic in 10 years is most nearly:

A. 2560 veh/hr

B. 3120 veh/hr

C. 3200 veh/hr

D. 3760 veh/hr

E. Transportation planning

Question 14: A gravity model is being used to estimate the number of trips from a business to three separate traffic zones. The number of trips generated by the business is estimated to be 1000 during the peak hour. Travel time, friction factor and total trips attracted by each zone are given in the table below. Assume a socio-economic factor of 1.0.

Zone	Time (min)	Friction (Fij)	Trips Attracted Aj
1	8	90	4000
2	12	60	4000
3	18	40	7500

The number trips from the business to zone 1 is most nearly:

A. 260

B. 330

C. 380

D. 400