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

Structural Design

NCEES Fundamentals of Engineering (FE)
CIVIL CBT Exam Specifications

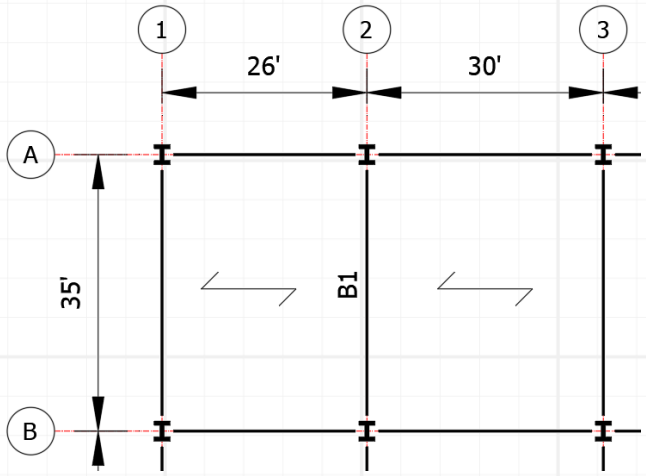
Effective Beginning with the July 2020 Examinations

Knowledge		Number of Questions
11. Structural Engineering		**10–15**
A.	Analysis of statically determinant beams, columns, trusses, and frames	Analysis
B.	Deflection of statically determinant beams, trusses, and frames	
C.	Column analysis (e.g., buckling, boundary conditions)	
D.	Structural determinacy and stability analysis of beams, trusses, and frames	
E.	Elementary statically indeterminate structures	
F.	Loads, load combinations, and load paths (e.g., dead, live, lateral, influence lines and moving loads, tributary areas)	Design
G.	Design of steel components (e.g., codes and design philosophies, beams, columns, tension members, connections)	
H.	Design of reinforced concrete components (e.g., codes and design philosophies, beams, columns)	

Notes
V1.00 published 2/20/2022
V1.1 title sheet 3/29/2022

F. Load, load combinations, and load paths

Question 1: A portion of a building plan is shown below. The direction of the deck span is as indicated. The structure must support a uniform dead load of 85 psf and a uniform live load of 125 psf. Using LRFD load combinations and applicable live load reduction, the required design moment, Mu, for beam B1 is most nearly:



A. 900 kip-ft

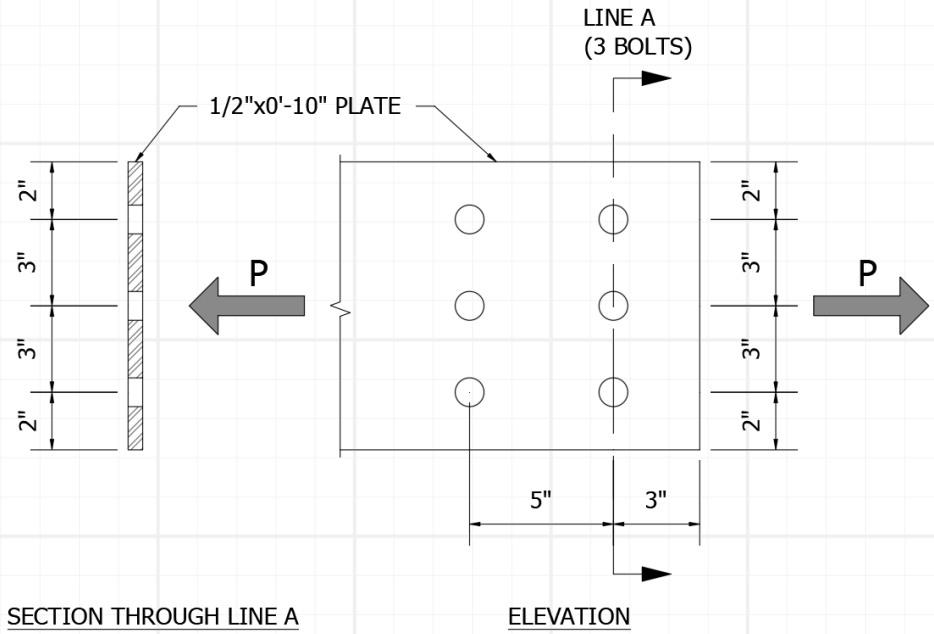
B. 940 kip-ft

C. 1,080 kip-ft

D. 1,300 kip-ft

G. Design of steel components

Question 2: A steel plate with dimensions shown below uses 3/4" diameter bolts in 13/16" diameter bolt holes to resist the tension load, P, as indicated. The plate is ASTM A36 steel with Fy = 36 ksi and Fu = 58 ksi. The maximum tension force that this plate can resist based on yielding and net section rupture only by LRFD is most nearly:



A. 160 kips

B. 162 kips

C. 192 kips

D. 214 kips

G. Design of steel components

Question 3: A W12x58 steel column with Fy = 50 ksi has an effective length of 30-feet about the strong axis and 12-feet about the weak axis. The available compressive strength of this column, ϕP_n, by LRFD with these effective lengths is most nearly:

A. 190 kips

B. 550 kips

C. 600 kips

D. 770 kips

G. Design of steel components

Question 4: A W18x55 steel beam spans 12-feet, is simply supported, uniformly loaded and braced laterally only at the ends. The beam is made from ASTM A992 Steel with Fy = 50 ksi. Under these conditions, the maximum available moment strength, ϕM_n, of this beam in flexure by LRFD is most nearly:

A. 295 kip-ft

B. 336 kip-ft

C. 383 kip-ft

D. 420 kip-ft

H. Design of reinforced concrete components

Question 5: When designing reinforced concrete beams to behave in a ductile manner, the reinforcement should generally be:

A. Over-reinforced

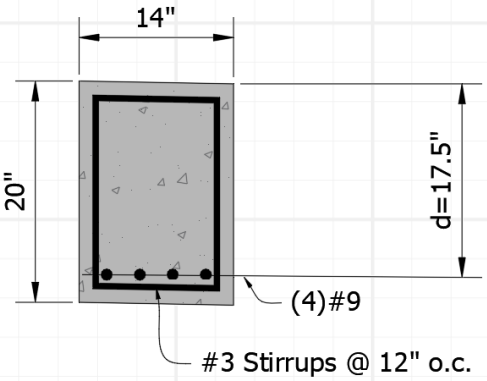
B. Balanced

C. Transitionally-reinforced

D. Under-reinforced

H. Design of reinforced concrete components

Question 6: A singly-reinforced concrete beam section is shown in the figure below. The beam has f'c = 6,000 psi and fy = 60,000 psi. The practical moment strength, ϕM_n, of the beam by LRFD is most nearly:



A. 255 kip-ft

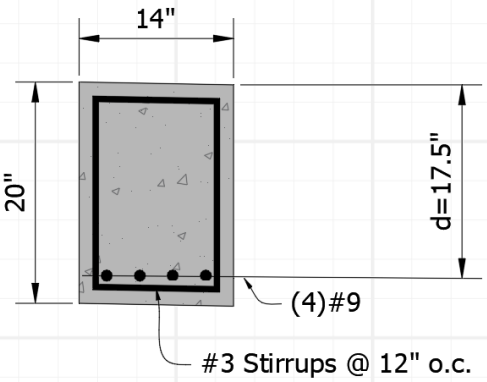
B. 270 kip-ft

C. 285 kip-ft

D. 315 kip-ft

H. Design of reinforced concrete components

Question 7: A singly-reinforced concrete beam section is shown in the figure below. The beam has normal weight concrete with f'c = 6,000 psi and rebar with fy = 60,000 psi. If this beam must resist an ultimate shear of 25 kips obtained using LRFD design combinations, what statement best describes the shear reinforcement provided?



A. The shear reinforcement is NOT required, but IS adequate

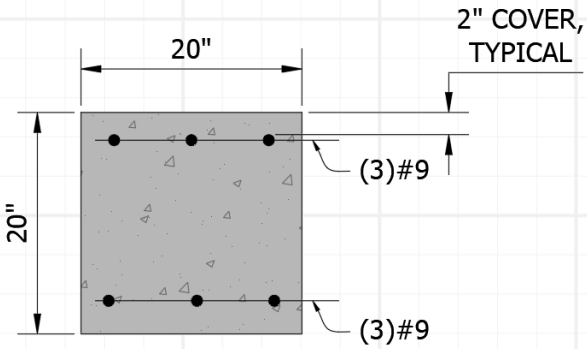
B. The shear reinforcement is NOT required, and IS NOT adequate

C. The shear reinforcement IS required, and IS adequate

D. The shear reinforcement IS required, but IS NOT adequate

H. Design of reinforced concrete components

Question 8: The reinforcement ratio for the longitudinal bars shown in the column below is most nearly:



A. 0.010

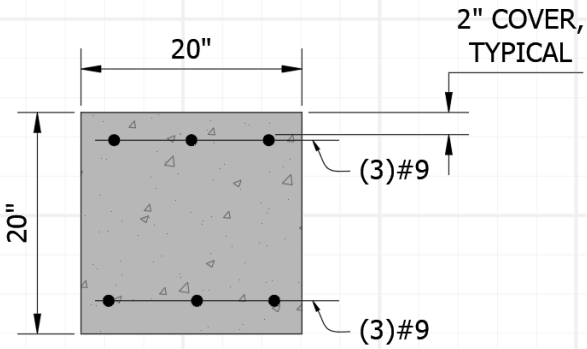
B. 0.015

C. 0.060

D. 0.080

H. Design of reinforced concrete components

Question 9: The available axial load-bearing capacity, ϕP_n, of the concentrically loaded short column shown below with fy = 60 ksi and f'c = 4 ksi by LRFD is most nearly:



A. 884 kips

B. 1224 kips

C. 1300 kips

D. 1700 kips