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NCEES - PE Civil Engineering

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Question: 1

Which of the following assumptions regarding the compression strength of concrete used in reinforced concrete beam design is valid?

A. The American Concrete Institute (ACI) recommends that all beams be designed using high strength concrete
B. High strength concrete compression strengths range from 3,000 to 7,000 pounds per square inch
C. Compression strength of normal concrete ranges from 3,000 to 7,000 pounds per square inch
D. None of the above

Answer: C

The assumption “compression strength of normal concrete ranges from 3,000 to 7,000 pounds per square inch” for the concrete used in reinforced concrete beam design is valid. ACI does not recommend that high strength concrete be used in the design of all beams. The compression strength of high strength concrete ranges from 7,000 - 15,000 pounds per square inch.

Question: 2

What is the velocity (in ft/sec) in a rectangular concrete channel with a width of 3 feet (ft), a hydraulic grade line slope of 0.002 ft/ft, a flow depth of 1.5 ft and an assumed Manning's coefficient n = 0.014?

A. 0.15 ft/sec
B. 1.50 ft/sec
C. 3.92 ft/sec
D. None of the above

Answer: C

the velocity in a rectangular channel with the given dimensions is 3.92 ft/sec. Solution: Use Manning's Equation and solve for V V = (K/n) R2/3 Sf1/2 Where: K = conversion coefficient (1.486 for English units, 1.0 for SI) n = 0.014, the Manning coefficient d = depth of flow = 1.5 ft w = width of channel = 3.0 ft Sf= channel slope = 0.002 ft/ft A = Area = d x w = 1.5 ft x 3 ft = 4.5 ft2 P = wetted perimeter = w + 2d = 3 ft + 3 ft = 6 ft R = hydraulic radius = A/P = (4.5 ft2)/ (6 ft) = 0.75 ft V = (1.486/0.014) x (0.75 ft)2/3 x (0.002 ft/ft)1/2 = 3.92 ft/sec

Question: 3

The hydraulic radius of a sewer refers to which of the following?

A. The diameter
B. Channel perimeter
C. One-half the diameter
D. The ratio of the cross-sectional area of flow to the wetted perimeter

Answer: D

The hydraulic radius of a sewer refers to the ratio of the cross-sectional area of flow to the wetted perimeter. (The wetted perimeter is the portion of a crosssection's perimeter that is "wet.") The equation that describes the hydraulic radius of a channel, Rh, is expressed as follows: Rh = A/P = cross sectional area of flow / wetted perimeter

Question: 4

For most proposed land development projects, pre- and post-development watershed drainage patterns are typically evaluated to determine if substantial hydrologic alterations are proposed that will result in which of the following?

A. Changes to groundwater recharge
B. Changes to water regime within a given resource area
C. Increase runoff from the area
D. All of the above

Answer: D

For most proposed land development projects, pre- and post-development watershed drainage patterns are compared to determine if substantial hydrologic alterations will be made to the watershed's groundwater recharge, water regime, and area runoff. The drainage patterns reviewed include the surface and subsurface paths of water entering, crossing, and leaving the site. Additionally, areas where water is stored within the project site are also evaluated for pre- and post-construction conditions.

Question: 5

Euler's Formula is used to determine which of the following properties related to

a simply-supported column?

A. Maximum bending moment
B. Critical buckling load
C. Shear stress
D. None of the above

Answer: B

Euler's Formula is used to determine the critical buckling load of a simplysupported column. Euler's Formula is expressed as follows: Fcr = [(E x I)(p2)]/L2
Where: - E = Young's modulus of the material used to construct the column - I = cross-sectional area moment of inertia - L = column length

Question: 6

What is the composite C value for the following drainage area for a 10-year storm recurrence interval?Drainage area: 0.25 acres of residential lots with 40% imperviousness (C = 0.49) 0.25 acres of lawn with 0.95% slope with 0% imperviousness (C = 0.22) 0.10 acres of impervious pavement (C = 0.95)

A. 0.20
B. 0.45
C. 0.55
D. Not enough information provided

Answer: B

The composite C value for the given drainage area for a 10-year storm recurrence interval is 0.45. Solution: Calculate composite C by using the following equation:
C = (C1A1 + C2A2 + C3A3) / (A1 + A2 + A3) C = [(0.25 acres x 0.49) + (0.25 acres x 0.22) + (0.10 acres x 0.95)]/ (0.25+0.25+0.10) C = 0.45

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