

River Course 201 Exam

Circle one correct answer for each question; Show your work for partial credit.

NAME: _____ AFFILIATION: _____

1. What is the bankfull discharge in a stream channel with a bankfull width of 24 ft, a bankfull width to depth ratio of 12, average slope of 0.01 ft/ft, and average bankfull velocity of 5 ft/s?
 - a. 1440 cfs
 - b. 240 cfs
 - c. 48 cfs
 - d. 10 cfs

2. What is the estimated average bankfull shear stress in the stream in Question # 1?
 - a. 0.1 pounds per square foot
 - b. 7.2 pounds per square foot
 - c. 0.05 pounds per square foot
 - d. 1.2 pounds per square foot

3. What is the most appropriate range of arm slopes for vanes?
 - a. 20 – 30 %
 - b. 0 – 10 %
 - c. 2 – 5 %
 - d. 10 – 14 %

4. What is the most appropriate range of Manning “n” values for natural meandering gravel-bed streams?
 - a. 0.3 – 0.6
 - b. 0.011 – 0.014
 - c. 0.03 – 0.04
 - d. 4 – 5

5. For a 2200-ft long stream with an existing slope of 0.012 ft/ft and existing sinuosity of 1.1, what are the appropriate design average slope and typical riffle slope if the design sinuosity is 1.4?
 - a. $S_{ave} = 0.0094$; $S_{rif} = 0.019$
 - b. $S_{ave} = 0.012$; $S_{rif} = 0.024$
 - c. $S_{ave} = 0.009$; $S_{rif} = 0.009$
 - d. $S_{ave} = 0.012$; $S_{rif} = 0.012$

River Course 201 Exam

Circle one correct answer for each question; Show your work for partial credit.

NAME: KEY AFFILIATION: _____

- What is the bankfull discharge in a stream channel with a bankfull width of 24 ft, a bankfull width to depth ratio of 12, average slope of 0.01 ft/ft, and average bankfull velocity of 5 ft/s?
 - 1440 cfs
 - 240 cfs** $W = 24 \text{ ft}, d = 2 \text{ ft}, A = 48 \text{ ft}^2, Q = 5 \text{ ft/s} \times 48 \text{ ft}^2 = 240 \text{ cfs}$
 - 48 cfs
 - 10 cfs
- What is the estimated average bankfull shear stress in the stream in Question # 1?
 - 0.1 pounds per square foot
 - 7.2 pounds per square foot
 - 0.05 pounds per square foot
 - 1.2 pounds per square foot** $\tau = 62.4 \text{ lb/ft}^3 \times 2 \text{ ft} \times 0.01 = 1.2 \text{ lb/ft}^2$
- What is the most appropriate range of arm slopes for vanes?
 - 20 – 30 %
 - 0 – 10 %
 - 2 – 5 %**
 - 10 – 14 %
- What is the most appropriate range of Manning “n” values for natural meandering gravel-bed streams?
 - 0.3 – 0.6
 - 0.011 – 0.014
 - 0.03 – 0.04**
 - 4 – 5
- For a 2200-ft long stream with an existing slope of 0.012 ft/ft and existing sinuosity of 1.1, what are the appropriate design average slope and typical riffle slope if the design sinuosity is 1.4?
 - $S_{ave} = 0.0094; S_{rif} = 0.019$** $S_{ave} \text{ decreases and } S_{rif} \text{ exceeds } S_{ave}$
 - $S_{ave} = 0.012; S_{rif} = 0.024$
 - $S_{ave} = 0.009; S_{rif} = 0.009$
 - $S_{ave} = 0.012; S_{rif} = 0.012$

6. Rock structures should be designed to withstand what flow conditions?
- Baseflow
 - Bankfull discharge
 - Extreme flood (e.g. 500-year discharge)
 - All of above**
7. What is the design bankfull riffle cross-section area for a Priority 2 stream restoration with the following design parameters? Bankfull discharge = 160 cfs; Average bankfull velocity = 4 ft/s; Bankfull width to depth ratio = 10
- 40 square feet** **$A = 160 \text{ cfs} / 4 \text{ ft/s} = 40 \text{ ft}^2$**
 - 16 square feet
 - 640 square feet
 - 10 square feet
8. For the stream design in Question # 7, what are the bankfull width and mean depth?
- W = 10 ft; d = 4 ft
 - W = 40 ft; d = 4 ft
 - W = 20 ft; d = 2 ft**
 - W = 16 ft; d = 1.6 ft
9. For the stream design in Question # 7, what is the minimum excavated floodplain width?
- 20 ft
 - 40 ft
 - 100 ft** **$ER = 5, W_{fpa} = 5 \times 20 \text{ ft} = 100 \text{ ft}$**
 - 200 ft
10. For the stream design in Question # 7, what is the most appropriate range of meander wavelengths?
- 140 – 240 ft** **$L_m = 7 \times 20 \text{ ft} = 140 \text{ ft}, L_m = 12 \times 20 \text{ ft} = 240 \text{ ft}$**
 - 60 – 100 ft
 - 500 – 800 ft
 - 7 – 12 ft