Continuing Education Course #271
Spillway Design for Small Dams

1. Which of the following are the main functions of the principle spillway?
- a. To safely pass the design storm flows.
- b. To maintain the desired water level in the pond.
- c. To allow the pond to be drained if necessary.
- d. All of the above.

2. What c value is generally used in calculating the flow over a sharp crested weir?
- a. 2.6.
- b. 3.2.
- c. 0.6.
- d. It depends on the depth of the water over the weir.

3. One type of weir has a trapezoidal shape which eliminates the need to correct for end contractions. What is the name of this type of weir?
- a. A Cippoletti weir.
- b. A broad crested weir.
- c. A V notch weir.

4. A Cippoletti weir has a width of 6 feet. What is the depth of flow required over the weir to pass the design flow of 25 CFS?
- a. 2 feet.
- b. 1.65 feet.
- c. 1.19 feet
- d. 0.95 feet.

5. What is the flow over a V notch weir with a 90° angle and a depth of flow of 2 feet?
- a. 14.1 CFS.
- b. 9.8 CFS.
- c. 23.6 CFS
- d. 0.5 CFS

6. What C_e value should be used for a V notch weir with a notch angle of 40°?
- a. 1.0.
- b. A 0.59.
- c. 0.581.
- d. 0.576.

7. What K_h value should be used for a V notch weir with a notch angle of 40°?
- a. 1 inch.
- b. 0.07 inches.

○ c. 0.05 inches.
○ d. 0.025 inches.

8. What is the flow over a V notch weir with a 40° angle and a depth of flow of 2 feet?
○ a. 12 CFS.
○ b. 5.2 CFS.
○ c. 3.5 CFS
○ d. 0.95 CFS.

9. What c value is generally used in calculating the flow over a broad crested weir?
○ a. 2.6.
○ b. 3.2.
○ c. 0.6.
○ d. It depends on the depth of the water over the weir.

10. A 12” diameter circular orifice provides the main outlet for a detention basin. The invert of the orifice is at elevation 90. What is the flow through the orifice when the water surface elevation in the basin is at elevation 94.5?
○ a. 5.5 CFS.
○ b. 6.5 CFS
○ c. 7.5 CFS.
○ d. 8.5 CFS.

11. What are the usual hydraulic appurtenances for control major flood releases from dams?
○ a. Principal spillways.
○ b. Vegetated spillways.
○ c. Floodgates (or gated spillways).
○ d. Vegetated spillways.

12. Why is it beneficial to have the emergency spillway as a separate structure from the principal spillway?
○ a. It is easier to analyze the hydraulics of the outlet.
○ b. The emergency spillway will not be affected if the principal spillway becomes clogged.
○ c. The emergency spillway must be vegetated.

13. According to the NRCS charts, what is the flow over a 10 foot wide vegetated emergency spillway with side slopes of 3:1 and an n value of 0.04 if the head is 2 feet.
○ a. 27 CFS.
○ b. 94 CFS.
○ c. 96 CFS.
○ d. 120 CFS.

14. According to the NY State Dam Hazard Classification system a Class “B” Dam will damage nothing more than isolated farm buildings, undeveloped lands, or township or county roads?
○ a. True.
○ b. False

15. How does the NJ Department of Environmental Protection classify a dam if its failure would likely cause a loss of life?
○ a. Class I
○ b. Class II.
○ c. Class III.
○ d. Class IV.

NOTE: The following question was revised on 31 October 2019

16. The NYDEC classifies a dam as a "large" dam if which of the following is true?
- a. The dam height is greater than 40 feet.
- b. The water impounded by the dam has an volume greater than 1000 acre-feet.
- c. Either a or b is true.
- d. Both a and b are true.

NOTE: The following question was revised on 2 January 2019

17. The Froude Number is defined as the ratio of inertial forces divided by gravitational forces.
- a. True.
- b. False.

18. If the Froude Number is greater than 1, then the flow is which of the following?
- a. Critical.
- b. Sub-critical.
- c. Super-critical.

19. Why are depths near critical depth unstable?
- a. Because flow is controlled upstream and disturbances are transmitted downstream.
- b. Because flow is controlled downstream and disturbances are transmitted upstream.
- c. Because small changes in the surface energy can lead to large changes in the local flow depth.

20. The corresponding sub-critical and super-critical depths for a specific energy value are known as conjugate depths.
- a. True.
- b. False.

21. Although a Froude Number of 1 divides sub-critical from supercritical flow, a fully formed hydraulic jump does not occur until the Froude Number reaches what value?
- a. 1.
- b. 1.7.
- c. 4.5.
- d. 9.

22. When the Froude Number is approximately 1.7 what is the relation between the conjugate depths d_1 and d_2?
- a. They are approximately equal.
- b. There is no relationship between the two.
- c. d_1 is approximately twice d_2.
- d. d_2 is approximately twice d_1.

23. When the Froude Number in the exist channel is between 1.7 and 2.5, baffles & sills are generally required in the stilling basin.
- a. True.
- b. False.

24. The water surface below a stable, well-balanced jump is characterized by which of the following?
- a. It is relatively smooth.
- b. It is turbulent.

25. When designing sills, baffles blocks, and similar energy dissipating devices in a stilling basin, it is important to take into account the added loads placed on the basin floor by the dynamic force brought against the face of the blocks.

○ a. True.
○ b. False.