

***** EXAMINATION *****

STRENGTH DESIGN FOR REINFORCED-CONCRETE HYDRAULIC STRUCTURES

1. **A reinforced concrete hydraulic structure is subjected to:**
 - a) wave action
 - b) submergence
 - c) chemically contaminated atmosphere
 - d) All of the above.

2. **Reinforced concrete hydraulic structures include:**
 - a) spillway piers
 - b) parking lot pavements
 - c) concrete houses
 - d) None of the above.

3. **The clear distance between parallel bars should not be less than:**
 - a) 0.5 time the nominal diameter of the bars.
 - b) 1.5 time the nominal diameter of the bars.
 - c) 2.5 time the nominal diameter of the bars.
 - d) 3.5 time the nominal diameter of the bars.

4. **The maximum center-to-center spacing of primary reinforcement**
 - a) will not exceed 6 inches
 - b) will not exceed 12 inches
 - c) will not exceed 18 inches
 - d) will not exceed 24 inches

5. **Butt splices should develop in tension at least:**
 - a) 25% of the specified yield strength of the bar.
 - b) 55% of the specified yield strength of the bar.
 - c) 85% of the specified yield strength of the bar.
 - d) 125% of the specified yield strength of the bar.

6. **To determine the factored moments for designing hydraulic**
 - a) structures, use the single load factor method
 - b) structures, use ACI 318 Building Code
 - c) Both a and b
 - d) None of the above.

7. **The stability analysis of structures must be performed using:**
- a) unfactored loads
 - b) factored loads
 - c) single moment analysis
 - d) None of the above.
8. **Diagonal tension is also known as:**
- a) the single load weight
 - b) shear
 - c) rotational strength
 - d) live load rotation
9. **The hydraulic structure and direct tension structure factors are:**
- a) 1.65 and 1.3
 - b) 1.3 and 1.5
 - c) 1.3 and 1.65
 - d) 1.65 and 1.0
10. **Design strength of reinforcement is normally:**
- a) 20,000 psi
 - b) 40,000 psi
 - c) 60,000 psi
 - d) 80,000 psi
11. **For walls greater than 10 feet the minimum wall thickness is:**
- a) 6 inches
 - b) 8 inches
 - c) 10 inches
 - d) 12 inches
12. **The minimum clear cover of reinforcement for a baffle block is:**
- a) 6 inches
 - b) 8 inches
 - c) 10 inches
 - d) 12 inches
13. **Lapped splices should not be used for bars larger than:**
- a) No. 7
 - b) No. 9
 - c) No. 11
 - d) No. 13
14. **A moment at the base of a retaining wall stem is 50 k-ft:**
- a) the recommended strength of steel is 105.30 k-ft
 - b) the recommended strength of steel is 110.50 k-ft
 - c) the recommended strength of steel is 123.44 k-ft
 - d) the recommended strength of steel is 131.25 k-ft

15. **Design for flexure utilizing compress reinforcement is:**
- a) not recommended.
 - b) recommended.
 - c) depends on the structure
 - d) None of the above
16. **The assumed maximum usable strain:**
- a) at the extreme concrete compression fiber equals 0.100
 - b) at the extreme concrete compression fiber equals 0.005
 - c) at the extreme concrete compression fiber equals 0.003
 - d) at the extreme concrete compression fiber equals 1.000
17. **Balanced conditions for hydraulic structures exist at a cross**
- a) section when the tension reinforcement exceeds its design strain
 - b) section when the tension reinforcement equals its design strain
 - c) section when the tension reinforcement reaches its design strain
 - d) None of the above
18. **The type and grade of reinforcing steel should be limited to:**
- a) ASTM A 615 Grade 60
 - b) ASTM A 615 Grade 40
 - c) Either a or b
 - d) Neither a nor b
19. **Grade 40 reinforcement:**
- a) should be avoided
 - b) has limited availability
 - c) is too conservative for normal procedures
 - d) All of the above
20. **Unformed surfaces in contact with a foundation should have:**
- a) minimum clear cover of reinforcement of 3 inches
 - b) minimum clear cover of reinforcement of 4 inches
 - c) minimum clear cover of reinforcement of 6 inches
 - d) minimum clear cover of reinforcement of 8 inches

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