

***** EXAMINATION *****

ICE ENGINEERING

1. A thermal reserve is:

- a) energy generated by the friction of the ice
- b) warmer water found at depth in lakes and reservoirs
- c) hot spring water
- d) built-up warm water in a sewage lagoon

2. Latent heat:

- a) is released when water freezes
- b) is within the surfaces of the ice
- c) is sometimes called mechanical heat
- d) is less than the freezing point

3. Flexural strength of ice is the maximum stress that ice can

- a) withstand at the center of the ice sheet
- b) withstand at the top of the center of the ice sheet
- c) withstand at the edge of the ice sheet
- d) None of the above

4. The crushing strength of ice is also known as:

- a) mechanical strength
- b) local strength
- c) breaking strength
- d) compressive strength

5. Elastic modulus describes the relationship between:

- a) stress and strain
- b) stress and center of gravity
- c) strain and the bending point
- d) stress and the bending point

6. Frazil ice:

- a) is formed in turbulent, supercooled water
- b) takes place in glaciers
- c) is formed under the smooth surface of the ice
- d) None of the above

7. **Snow ice:**
- a) is a form of static ice
 - b) results from the presence of a snow cover on the ice
 - c) is granular
 - d) All of the above
8. **The differential equation describing the thermal growth rate assumes:**
- a) ice is homogenous
 - b) thermal conditions are quasi-steady
 - c) heat flux from the water is negligible
 - d) All of the above
9. **Dynamic ice cover formation may result from:**
- a) bridging
 - b) juxtaposition
 - c) ice cover shoving
 - d) All of the above
10. **Ice cover breakup may take the form of:**
- a) an ice-breaking ship
 - b) thermal meltout
 - c) thermal transformation
 - d) All of the above
11. **Mechanical ice cover breakup may be the result of:**
- a) thermal transformation
 - b) thermal meltout
 - c) the formation of shore cracks
 - d) None of the above
12. **Formation of ice jams is a form of:**
- a) thermal transformation
 - b) thermal meltout
 - c) mechanical ice cover breakup
 - d) None of the above
13. **Ice control may be influenced by modifying the annual cycle of:**
- a) Ice formation
 - b) ice heating
 - c) stationary ice breakup
 - d) None of the above
14. **Ice booms:**
- a) are also known as rigid structures
 - b) may be piers, cribs, or dolphins
 - c) are made from floating pontoons
 - d) None of the above

15. **Thermal control:**

- a) is used to normalize ice cover
- b) may use heat from power plants
- c) Both a and b
- d) None of the above

16. **A fence boom:**

- a) is a structure
- b) is supported by steel cables
- c) rests on the stream bed
- d) All of the above

17. **The improvement of channels for ice control:**

- a) has a high cost
- b) has a low cost
- c) has minimum environmental impact
- d) will result in a shallow channel

18. **An air bubbler:**

- a) uses cold water
- b) uses convection of warm water
- c) must use a special air supply
- d) None of the above

19. **Warm water sources may include:**

- a) discharged treated sewage
- b) industrial plants
- c) power plants
- d) All of the above

20. **The energy output release is:**

- a) less than the electrical output of the plant
- b) usually equal to the electrical output of the plant
- c) greater than the electrical output of the plant
- d) may be answer a or b

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