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PO BOX 5839  
MC ALLEN, TEXAS 78502-5839**

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**\*\*\* EXAMINATION \*\*\***

**DETERMINATION OF ELASTIC TWIST IN HORIZONTAL AXIS WIND TURBINES**

1. **Certain wind turbine rotors have demonstrated:**
  - a) aero-elastic instabilities
  - b) blade flexibility problems
  - c) excessive velocity
  - d) Both A and B
  
2. **In fixed pitch rotor systems, an added potential**
  - a) flexibility problem is stall flutter
  - b) flexibility problem is reverse flutter
  - c) flexibility problem is elongated flutter
  - d) flexibility problem is static flutter
  
3. **For wind turbines to be cost competitive in the future:**
  - a) blade and rotor weights must be low
  - b) blade and rotor weights must be heavy
  - c) steel materials must cost more
  - d) steel materials must be heavier
  
4. **Two major sources of the torsional moments are**
  - a) inertial and positional
  - b) aerodynamic and positional
  - c) aerodynamic and inertial
  - d) None of the above
  
5. **A cause of large elastic pitch errors at the hub**
  - a) are hard attachments
  - b) are soft attachments
  - c) are long attachments
  - d) All of the above
  
6. **The wind turbine performance programs were developed by:**
  - a) Solar Energy Commission
  - b) Solar Energy Research Institute
  - c) Solar Energy Program
  - d) Solar Energy Teaching Commission

7. **The experimental testing program consisted of:**
- a) inspection
  - b) static loading
  - c) frequency of vibration tests
  - d) All of the above
8. **The four modulus values needed for discarded**
- a) blade section tests were tensile
  - b) blade section tests were shear
  - c) blade section tests were positional
  - d) Both A and B
9. **Bench tests can be expected to verify:**
- a) the elastic constants
  - b) the masses
  - c) Both a and b
  - d) Neither a nor b
10. **Blade sectioning tests for natural bending frequencies**
- a) will verify the masses
  - b) will verify the elastic constants
  - c) Both a and b
  - d) Neither a nor b
11. **The static deflection test for natural bending frequencies**
- a) is least sensitive to the stiffness properties
  - b) is most sensitive to the stiffness properties
  - c) is not sensitive to the stiffness properties
  - d) is any of the above depending on the frequency
12. **When three new values are created, the value T is:**
- a) the distance from nail to quarterchord
  - b) the vertical correction to droop
  - c) the radian equivalent of the degree measurements
  - d) sine function
13. **When three new values are created, the value V is:**
- a) the distance from nail to quarterchord
  - b) the vertical correction to droop
  - c) the radian equivalent of the degree measurements
  - d) sine function
14. **The most complicated blade to test**
- a) deflection results is the Carter 100
  - b) deflection results is the Carter 200
  - c) deflection results is the Carter 300
  - d) deflection results is the Carter 400

15. **The ESI was much stiffer and had a:**
- a) simpler test rate
  - b) simpler base model
  - c) simpler wing model
  - d) simpler internal structure
16. **Deflection test reflect an reiteration error of the**
- a) original assumed laminate constants are deflections
  - b) original assumed laminate constants are reflections
  - c) original assumed laminate constants are intersections
  - d) original assumed laminate constants are bi-sections
17. **The section axes of a blade cross-section have**
- a) origin at the nose
  - b) origin at the abscissa
  - c) origin at the tail
  - d) both a and b
18. **Section area properties are found by:**
- a) simple subtraction
  - b) simple integration
  - c) simple addition
  - d) simple summation
19. **Section stiffness properties are found by the:**
- a) the area-volume method
  - b) the area-height method
  - c) the area-weighting method
  - d) the area-mass method
20. **The AEI program uses a shear flow approach in**
- a) calculating a usual thin-skin airfoil with a D-spar
  - b) calculating a usual thick-skin airfoil with a D-spar
  - c) calculating a usual round airfoil with a D-spar
  - d) calculating a usual cylindrical airfoil with a D-spar

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<b>*** ANSWER SHEET *** U439</b>  <b>DETERMINATION OF ELASTIC TWIST IN          HORIZONTAL AXIS WIND TURBINES</b>	<b>STATE BOARD</b>	<b>COURSE NO.</b>	<b>VALUE</b>
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