

**GEOGRAPHIC INFORMATION SYSTEMS
GEOGRAPHIC INFORMATION CENTER
PO BOX 5839
MC ALLEN, TEXAS 78502-5839**

1-800-522-0139

**kh@acnet.net
Copyright 2010**

***** EXAMINATION *****

**SMART SENSOR SYSTEM FOR STRUCTURAL
CONDITION MONITORING OF WIND TURBINES**

1. **The lifetime of a wind turbine blade is**
 - a) about 10 years
 - b) about 20 years
 - c) about 30 years
 - d) about 40 years

2. **Wind turbine blades are usually made from:**
 - a) fiberglass
 - b) steel
 - c) wood
 - d) none of the above

3. **The approach to reduce the number of TBIMs is:**
 - a) SNN
 - b) SNS
 - c) SNT
 - d) SNU

4. **SHM has not been widely used in industry due to:**
 - a) weight of the added sensors
 - b) cost of the added sensors
 - c) complexity of the added sensors
 - d) all of the above

5. **Series connected sensors are**
 - a) circuit sensors
 - b) continuous sensors
 - c) alternative sensors
 - d) none of the above

6. **Sensors are created by fibers called**
 - a) PZT 5A
 - b) PZT 6A
 - c) PZT 7A
 - d) PZT 8A

7. **The bulk coercive field for PZT 5A material is:**
- a) approximately 8 kilovolts per centimeter
 - b) approximately 10 kilovolts per centimeter
 - c) approximately 11 kilovolts per centimeter
 - d) approximately 13 kilovolts per centimeter
8. **The charge produced by an AE sensor is very:**
- a) exciting
 - b) bright
 - c) large
 - d) small
9. **A generic sensor system architecture is:**
- a) RNS
 - b) SNS
 - c) TNS
 - d) UNS
10. **The CNT neuron is connected to a:**
- a) wheatstone short circuit
 - b) wheatstone positional circuit
 - c) wheatstone bridge circuit
 - d) wheatstone fiber circuit
11. **A key component in the SHM system is:**
- a) a dedicated local processor
 - b) a dedicated hard processor
 - c) a dedicated soft processor
 - d) none of the above
12. **Distributed sensors are used to measure**
- a) cycles
 - b) vibration
 - c) the location of ridges
 - d) All of the above
13. **Panels with continuous sensors were developed for:**
- a) verification of the SGM technique
 - b) verification of the SHM technique
 - c) verification of the SLM technique
 - d) verification of the SMM technique
14. **In developing a blade testing algorithm**
- a) consider the color of the blade
 - b) consider the cost rarely
 - c) consider the large size of the blades
 - d) All of the above

15. **The development of a smart blade**
- a) would mimic the physiological system
 - b) would mimic the biological nervous system
 - c) would mimic the latest robotic systems
 - d) none of the above
16. **The CNT neuron is connected to a wheatstone bridge circuit:**
- a) and an amplifier
 - b) and a filter
 - c) and an oscilloscope
 - d) all of the above
17. **The CNT neuron might be thorough as many strain gages:**
- a) connected in a series
 - b) connected in a row
 - c) connected in a box
 - d) none of the above
18. **Piezoresistive sensing is used to detect damage using:**
- a) a sub-frequency data acquisition system
 - b) a non-frequency data acquisition system
 - c) a low frequency data acquisition system
 - d) a high frequency data acquisition system
19. **The two sensor types that can be used in the SNS:**
- a) the piezoelectric AE sensor
 - b) the piezoresistive CNT distributed strain sensor
 - c) the long and short sensors
 - d) both a and b
20. **SNS is a viable method for SHM of complex:**
- a) composite structures
 - b) composite neurons
 - c) composite atoms
 - d) composite blades

GEOGRAPHIC INFORMATION SYSTEMS
 GEOGRAPHIC INFORMATION CENTER
 PO BOX 5839
 MC ALLEN, TEXAS 78502-5839

1-800-522-0139
 kh@acnet.net
 Copyright 2010

*** ANSWER SHEET *** U440 SMART SENSOR SYSTEM FOR STRUCTURAL CONDITION MONITORING OF WIND TURBINES	<u>STATE BOARD</u>	<u>COURSE NO.</u>	<u>VALUE</u>
			8 PDH
Office Use Only			

FILL IN ONE BOX FOR EACH ANSWER.

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

I hereby certify that I studied the course materials, and the above answers are my own. No one has helped me to complete this exam.

 Signature Date

 Printed or typed name

 Seal or Number

**GEOGRAPHIC INFORMATION SYSTEMS
GEOGRAPHIC INFORMATION CENTER
PO BOX 5839
MC ALLEN, TEXAS 78502-5839**

**(800) 522-0139
kh@acnet.net
Copyright 2010**

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____ E-Mail _____

Fax _____ () 24-Hour Fax

() Yes () No If fax and telephone are the same number, shall we call first?

Mail the certificates to above address _____ check address _____ envelope address

State + Specialty + PE Registration number (i.e. TX EE 12389) _____

State + Professional Land Surveying registration number _____

NC (North Carolina) + Specialty + PE Registration number _____

NC (North Carolina) + Professional Land Surveying registration number _____

Professional Affiliations _____

Return this page with your answer sheet and a check or money order for \$100 per course. Use one check for each registrant (in your company) taking one or more courses. We accept company checks (if they are your employer's). We do not accept third-party checks or checks outside of your city of residence. Using third-party checks that do not include your name or company name may invalidate your professional development hours being reviewed by an audit process. Add \$5 for same day processing and priority shipping.

Make checks or money orders payable to Geographic Information Systems.

