

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

1-800-522-0139

**kh@acnet.net
Copyright 2010**

***** EXAMINATION *****

**CHARACTERISTICS OF ULTRASONIC RANGING
SENSORS IN AN UNDERGROUND ENVIRONMENT**

1. **Computer-aided vehicle guidance requires:**
 - a) test data
 - b) sensor data
 - c) directional data
 - d) none of the above

2. **This study showed ultrasonic ranging is a valid method for:**
 - a) machine navigation
 - b) personnel navigation
 - c) road navigation
 - d) mine navigation

3. **Accurate range readings were obtained up to a:**
 - a) 60 degree angle of incidence
 - b) 70 degree angle of incidence
 - c) 80 degree angle of incidence
 - d) 90 degree angle of incidence

4. **Ultrasonic rangers transit short bursts of high frequency:**
 - a) sound energy, commonly in the 5 to 40 kHz range
 - b) sound energy, commonly in the 10 to 50 kHz range
 - c) sound energy, commonly in the 13 to 60 kHz range
 - d) sound energy, commonly in the 15 to 70 kHz range

5. **The blanking range used in this experiment is:**
 - a) 0.0 to 0.9 ft
 - b) 0.3 to 1.2 ft
 - c) 0.6 to 1.5 ft
 - d) 0.9 to 1.8 ft

6. **To compare ranger and physical survey data**
 - a) connected sonar ray was used
 - b) red sonar ray was used
 - c) eclectic sonar ray was used
 - d) acoustic sonar ray was used

7. **These losses occur during the collision of gas molecules:**
- a) as the sound wave travels, nuclear
 - b) as the sound wave travels, atomic
 - c) as the sound wave travels, molecular
 - d) as the sound wave travels, enormous
8. **Some very smooth surfaces, such as polished metal, water:**
- a) reflect the sound with very significant scattering
 - b) reflect the sound without any significant scattering
 - c) reflect the sound with minimal scattering
 - d) none of the above
9. **Range readings defined the rib with adequate precision at:**
- a) 40 degrees incidence
 - b) 50 degrees incidence
 - c) 60 degrees incidence
 - d) 70 degrees incidence
10. **The Milltronics ST-25 ranger has a rated beam width of:**
- a) 3 degrees
 - b) 6 degrees
 - c) 9 degrees
 - d) 12 degrees
11. **Obstacles that need to be identified in the vehicles course:**
- a) are equipment
 - b) are rocks from roof
 - c) are personnel
 - d) all of the above
12. **Two types of ultrasonic ranging transducers commonly used:**
- a) for ranging in air are electrostatic and piezoelectric
 - b) for ranging in air are electrostatic and electromagnetic
 - c) for ranging in air are electromagnetic and piezoelectric
 - d) none of the above
13. **This transducer impresses an ac voltage on a crystal:**
- a) electrostatic transducers
 - b) piezoelectric transducers
 - c) electromagnetic transducers
 - d) electron transducers
14. **The velocity of sound at 20 degrees Celsius is:**
- a) 1,075 ft/s
 - b) 1,125 ft/s
 - c) 1,175 ft/s
 - d) 1,225 ft/s

15. **This kind of ranger can be treated as a plane, circular:**
- a) piston set in an infinite baffle; magnetic
 - b) piston set in an infinite baffle; electrostatic
 - c) piston set in an infinite baffle; ultrasonic
 - d) piston set in an infinite baffle; piezoelectric
16. **Comparing ranger and physical data is performed by**
- a) a laser sonar gun
 - b) a laser sonar ray
 - c) an acoustic sonar gun
 - d) an acoustic sonar ray
17. **The angle between a perpendicular-to-the target surface and:**
- a) the sonar ray is the angle of incidence
 - b) the sonar ray is the angle of importance
 - c) the sonar ray is the angle of the sonar ray
 - d) the sonar ray is the angle of the mine
18. **These losses occur during the expansion and compression of:**
- a) the air as the sound wave advances; friction losses
 - b) the air as the sound wave advances; viscous losses
 - c) the air as the sound wave advances; wreckage losses
 - d) the air as the sound wave advances; sensor losses
19. **The sound wave causes temperature variations that produce:**
- a) heat conduction losses
 - b) sensor conduction losses
 - c) moist conduction losses
 - d) none of the above
20. **If the actual ambient speed of sound is used for all:**
- a) calculations, the ranging accuracy is greatly improved
 - b) calculations, the vehicle accuracy is greatly improved
 - c) calculations, the sonar accuracy is greatly improved
 - d) calculations, the mine accuracy is greatly improved

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 *** U468 CHARACTERISTICS OF ULTRASONIC RANGING SENSORS IN AN UNDERGROUND ENVIRONMENT	<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.

