**2015 Northern Mine Rescue Contest**

**Written Exam**

**Technician Team Competition**

**BioPak 240R**

**2010**

**2015**

**July 28, 2015**

**Clymer, New York**

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**BioPak 240R**

**Directions: Fill in the corresponding bubble on your Scantron sheet to indicate the letter preceding the correct answer to each of the following questions. Select only one answer per question.**

1. The quality of OXYGEN used to supply and charge the breathing apparatus (BioPak 240R) must be:

	1. Medical or Aviation grade oxygen with a moisture content less than 50 mg/m3 at 207 bar/3000 psig
	2. Breathing Oxygen with moisture content above 50 mg/m3 at 207 bar/3000 psig
	3. Medical or Aviation grade oxygen with a moisture content greater than 50 mg/m3 at 207 bar/3000 psig
2. The Electronics Intrinsic Safety Assessment Procedure must be performed:

	1. After each use
	2. Each time the batteries are replaced
	3. During monthly maintenance
3. The breathing loop is best described as:

	1. Oxygen supplied from the regulator to the mask
	2. Oxygen supplied from the top of the breathing chamber
	3. Oxygen supplied from the breathing chamber, hoses, facemask connector and the mask
4. Which of the following is true:

	1. Pre-Wetting of the three sponges is optional
	2. Pre-wetting of the sponges will result in cooler initial breathing gas temperatures
	3. All of the above
5. Long Term Maintenance is performed on a BioPak 240 R monthly if:

	1. The BioPak is in constant use
	2. Turn-Around Maintenance has been skipped
	3. All of the Above
6. The Moisture Pad is removed from the foil pouch and is installed in the breathing chamber:

	1. Next to either of the CO2 canisters
	2. Placed on top of the two CO2  canisters
	3. Placed between the lower of the two CO2 canisters and the breathing chamber
7. The alarming system consists of a redundant and independent system status indicators. Which BEST describes this:

	1. Electronic pressure switches and gauge
	2. Pneumatic Pressure gauge and Electronic Monitor
	3. Oxygen cylinder gauge, horn, and lights
8. Which best describes a low battery alarm:

	1. Beeping monitor
	2. Blue light and beeping monitor
	3. Flash Red, Green, Blue and Horn Sounding
9. During the low pressure leak test which of the following is true:

	1. Open the Bleed Valve on the Tester
	2. Insert two test keys into the key holes on the back of the machine
	3. Depress the demand valve
10. Elevated levels of CO2 in the breathing gas is most likely a result of:

	1. Failing to install the moisture pad next to the proper CO2 canister
	2. Failing to purge the Breathing Chamber during donning
	3. Failing to breathe in through the mouth and out the nose
11. To power up the MX6 instrument, locate, press and hold the center [ENTER] navigation button for at least 5 seconds.
12. True
13. False
14. Silicone compound vapors or other known contaminants may affect the combustible gas sensor and cause readings of combustible gas to be lower than actual gas concentrations.
15. True
16. False
17. Four different cradles are available for use with the MX6 multi-gas monitor.
18. True
19. False
20. The MX6 has a four-way Navigation button.
21. True
22. False
23. The sensor readings are displayed as solid \_\_\_\_\_\_\_\_ numerals during normal operation, and solid \_\_\_\_\_\_\_\_\_ numerals during alarm conditions.
24. Black, Black
25. Black, Red
26. Red, Red
27. Black, Yellow
28. Up to \_\_\_\_\_\_\_\_\_\_ sensors may be displayed on the instrument screen.

	1. Three
	2. Four
	3. Five
	4. None of the Above
29. Alkaline battery packs are only approved for use with \_\_\_\_\_\_ or \_\_\_\_\_\_ batteries in the instrument.
30. Duracell MN 1500, Rayovac LR6
31. Duracell MN 2000, Rayovac LR8
32. Duracell MN 2500, Rayovac LR10
33. None of the above
34. When calibrated using methane concentrations less than 5% of volume, reading accuracy of the infrared methane sensor may not be guaranteed to be better than \_\_\_\_\_\_\_\_?
35. +/- 15%
36. +/- 20%
37. +/- 25%
38. None of the above
39. The Normal Operations Menu has a \_\_\_\_\_\_\_\_\_ background and the Configuration Menu has a \_\_\_\_\_\_\_\_\_\_ background on LCD.
40. White, Blue
41. White, Red
42. White, Yellow
43. White, Black
44. The measurement resolution for a Methane sensor with 0% to 5% volume is \_\_\_\_\_\_\_\_% volume.
45. 1.0
46. 0.1
47. 0.01
48. 0.001
49. Nitric Oxide will burn and can explode.
50. True
51. False
52. The formula for Acetylene is C2H6.
53. True
54. False
55. The Explosive Range of Propane is from \_\_\_\_ to \_\_\_\_\_ % in normal air.
56. 1.12, 7.35
57. 1.52, 7.85
58. 1.92, 9.15
59. 2.12, 9.35
60. Solubility is the ability of a gas to be dissolved in air.
61. True
62. False
63. The Specific Gravity of Carbon Dioxide (CO2) is 1.5921.

	1. True
	2. False
64. Quantity (feet3/ minute) = Area (feet2) X Velocity (feet/minute). If the Quantity of airflow is 13,140 (feet3/minute)and the area of the entry is 200 feet2 then the velocity is \_\_\_\_\_\_\_.

	1. 65.7
	2. 6.57
	3. 657
	4. None of the Above
65. High –velocity anemometer is used to determine air velocities from \_\_\_\_\_\_ to \_\_\_\_\_\_\_ feet/minute.

	1. 120 to 2,000
	2. 2,000 to 8,000
	3. 2,000 to 10,000
	4. None of the Above
66. During rescue team explorations, the MAIN FAN:

	1. Should be continually monitored
	2. Should be operated continuously
	3. Both A. and B
	4. None of the above
67. The main purpose of a regulator is:

	1. A line brattice cloth/plastic that is hung to channel intake air into a working area.
	2. To direct air to where it is needed and to keep intake air from short-circuiting to the exhaust fan before it reaches the working area.
	3. A wall or partition constructed of incombustible material across a passageway to direct the ventilating air in its proper course.
	4. Adjustable door/opening in a bulkhead, or a partially open mine door, used to control and adjust the quantity of airflow in the mine in order to ensure proper distribution.
68. Two Instruments used to measure velocity of airflow in a mine are:

	1. Flame safety lamp and smoke tube.
	2. Anemometer and smoke tube.
	3. Methane detector and anemometer.
	4. Multi-gas detector and smoke tubes.

**ANSWER KEY**

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**BioPak 240R**

Questions 1 – 10 : USER Manual - Rev G and BENCHMAN Manual - Rev K
Questions 11 – 20 : MX6 iBrid Operation Guide – Rev 9
Questions 21 – 30 : MSHA 3027 (2008) - Module 2 (Mine Gases) & Module 3 (Ventilation)

Question Answer Source

1. A. USER page 3, BENCHMAN page 4
2. B. USER page 4, BENCHMAN page 5
3. C. USER page 7, BENCHMAN page 8
4. C. USER page 10
5. A. USER page 4, BENCHMAN page 5
6. C. USER page 11, BENCHMAN page 17
7. B. USER page 7, BENCHMAN page 8
8. C. BENCHMAN pages 8-9
9. B. BENCHMAN page 15
10. A. USER page 11
11. B. False, page 15 (at least 3 seconds)
12. A. True, page 4 (lower than)
13. B. False, page 7 (Three different)
14. B. False, page 15 (five-way)
15. B. Page 17 (Black, Red)
16. D. None of the Above, page 16 (up to six)
17. A. Page 3 (Duracell MN 1500, Rayovac LR6)
18. B. Page 6 (+/- 20%)
19. C. Page 7 (White, Yellow)
20. C. Page 38 (0.01)
21. B. False, page 2-17
22. B. False, page 2-24 (C2H2)
23. D. Page 2-23 (2.12, 9.35)
24. B. False, page 2-7 (in water)
25. B. False, page 2-15 (1.5291)
26. D. None of the Above, page 3-20 (65.7 fpm)
27. C. Page 3-21 (2,000 to 10,000)
28. C. Both A. and B., page 3-4
29. D. Page 3-54
30. B. Anemometer and smoke tube, pages 3-16 & 3-18