2012 National Metal and Nonmetal Mine Rescue Contest

Technician Team Competition
Written Test (BioPak 240R)

Directions:

1. **Find the correct answer to each of the questions.**
2. **Select only one answer per question.**
3. **Then, fill in the corresponding circle on the answer sheet for each numbered question.**

Good Luck!

July 31, 2012

2012 Metal/Nonmetal National Mine Rescue Contest

Technician Team (Bio Pak 240R) Competition – Written Test

Please do not write on this test. Use the answer sheet provided.

1. Oxygen deficient atmospheres may cause readings of combustible (methane) gas to be higher than the actual concentration.

    A. True
    B. False

2. Oxygen enriched atmospheres may cause readings of combustible (methane) gas to be lower than actual concentrations.

    A. True
    B. False

3. Silica can affect the combustible gas sensor and may cause readings to be lower than actual gas concentrations.

    A. True
    B. False

4. Sudden changes in atmospheric pressure will not cause temporary fluctuations in the oxygen readings.

    A. True
    B. False

5. The manufacturer recommends that a functional (bump) test be performed on the gas instrument after each day's use.

    A. True
    B. False

6. The iTX and MX6 multi-gas instrument is certified for use within an ambient temperature of -45° C to 60° C.

    A. True
    B. False

7. When the battery life is nearing the end, the following occurs (answer the question for your instrument):

For the iTX, with a minimum of 30 minutes of battery life, the unit will emit a periodic tone.	For the MX6 iBrid, if the remaining runtime is less than 30 minutes, “Low Battery” is displayed.

   A. True
   B. False

8. Marginal calibration if the span reserve is between _____ to _____ of the applied (calibration) gas value/concentration.

   A. 20% to 60%
   B. 40% to 60%
   C. 60% to 80%
   D. None of the above

9. While in the normal operational mode the screen on your instrument shows the battery at the _____ of the screen.

   A. top middle
   B. top right
   C. bottom middle
   D. bottom right
   E. None of the above

10. When the gas instrument is in non-latching mode, alarms set according to the Technician Team Competition in the MNM National Mine Rescue Contest Rule book exposed to 20.4% Oxygen, 1.2% Methane, 40.0 ppm Carbon Monoxide, and 2.0 ppm Nitrogen Dioxide, it will _____.

   A. be in high alarm condition
   B. display “40” for Carbon Monoxide reading
   C. display “2.0” for Nitrogen Dioxide reading
   D. All of the above
   E. Only B and C
   F. None of the above

11. During exploration of a mine and the mine rescue team loses communication with the command center the captain has the authority to change the ventilation during an emergency.

   A. True
   B. False

12. The basic principle underlying mine ventilation is the air always moves from low pressure regions to high pressure regions. Therefore, in order to get the air to flow from the intake to the exhaust, the exhaust air must be at a higher pressure than the intake.

    A. True
    B. False

13. An anemometer is a small sort of windmill with a mechanical counter for recording the number of revolutions caused by the moving air current. A regular anemometer is used for measuring velocities from _____ to _____ feet per minute.

    A. 110 to 2,000
    B. 150 to 2,000
    C. 120 to 2,000
    D. None of the above

14. Carbon monoxide is explosive and flammable. It is highly toxic even in very low concentrations. It doesn't take much CO to interfere with your blood's oxygen-carrying capacity because the gas combines with hemoglobin _____ to _____ times more than oxygen.

    A. 100 to 300
    B. 150 to 300
    C. 200 to 300
    D. None of the above

15. Hydrogen at high concentrations can replace oxygen in the air and act as an asphyxiant. Also hydrogen is highly explosive. The explosive range is _____ to _____ in air with as little as 5% oxygen.

    A. 4.0 to 74.2%
    B. 12.5 to 74.2%

16. Under 30 CFR §49.6(a)(6), MSHA requires mine rescue stations serving underground M/NM mines to have _____ gas detectors appropriate for each gas which may be encountered at the mines served.

    A. one
    B. two
    C. four
    D. six

17. Carbon Dioxide is a normal component of air and is a product of incomplete combustion; it also a by-product of respiration process. In some mines, it liberated from the rock strata.

    A. True
    B. False

18. Sulfur Dioxide is very toxic, irritating gas that is dangerous even in small concentrations; as little as _____% to _____ % is dangerous to life.

    A. 0.01 to 0.02
    B. 0.02 to 0.03
    C. 0.03 to 0.04
    D. 0.04 to 0.05

19. Nitrogen Dioxide is very toxic even small amounts will irritate your throat. It mixes with moisture in your lungs to form acids that corrode the respiratory passages and causes them to swell. Exposure to .015% can be fatal.

    A. True
    B. False

20. Specific gravity is not the only factor that determines how quickly a gas will diffuse; temperature and pressure also affect it. A decrease in temperature makes a gas diffuse more rapidly; an increase in pressure also speeds up the rate of diffusion.

    A. True
    B. False

21. It is recommended to inspect and re-lubricate the vent valve O-Rings after every ____.

    A. 25 uses
    B. 50 uses
    C. 100 uses
    D. year of use

22. The BioPak 240 Revolution is suitable for respiratory protection during entry into and escape from oxygen deficient atmospheres with a temperature range 5º C to 43º C.

    A. True
    B. False

23. Ice canister freezing: place the cleaned and dried canister into the freeze form supplied with each SCBA. Freeze the ice canister for a maximum of eight (8) hours before use at a maximum temperature of 10º F. Date and initial ice canister placed in freezer on the turn-around maintenance tag.

    A. True
    B. False

24. The low oxygen alarm must activate between 650-1000 psig and is indicated by a flashing red light and audible alarm. The MMS will automatically power down once the system pressure dropped below _____ psig.

    A. 20
    B. 25
    C. 30
    D. 35

25. Constant use of the 240R apparatus is defined as being in use at least _____.

    A. once a week
    B. once every two weeks
    C. once every three weeks
    D. once a month

26. The battery of the RMS needs to be replaced when the low battery alarm has activated or after _____ hours of use or every _____, whichever comes first.

    A. 100 hours or 3 months
    B. 150 hours or 4 months
    C. 200 hours or 6 months
    D. 200 hours or 12 months

27. SCBA assembly; install the center section into the upper housing making sure to align the diaphragm spring retainers with the three upper housing springs. Insert the four retainer pins and install the PCM canister onto the center section.

    A. True
    B. False

28. Allow the SCBA's pressure to stabilize at 6-8-inches of water column of pressure. The test gauge will stop creeping upward when the SCBA reaches stabilization. After one minute, the pressure gauge of the test kit shall indicate on less than _____ water column pressure below the stabilized starting pressure.

    A. 0.01-inches
    B. 0.02-inches
    C. 0.1-inches
    D. 0.2-inches

29. The BioPak and RMS are designed with no factory mandatory component rebuilds or replacement required during their lifetime of _____ years.

    A. 10
    B. 15
    C. 20
    D. 25

30. Using the improper type of lubricant creates serious safety hazards with the potential for combustion; use only Dow-111 on high-pressure O-rings.

    A. True
    B. False