
RIGAS Field Service Engineer – Industrial Background Test

Preface

This test is not intended to create a pass/fail grade. It is designed to find out how much you know or how much you can figure out. My senior staff wouldn't "ace" this test, so you won't either (probably). If you do "ace it," you are worth big bucks in the industrial world! Let's talk!

If you can't answer any of the questions, most likely you haven't been working in the industrial instrumentation field. If you created a test specific to your chosen field or work experience, I probably wouldn't do very well either.

If you can answer a few of the questions off the top of your head, great! If you know that you've learned (and then forgotten due to lack of use) answers to a bunch of these other questions, that's even better! Contact us; we want to explore your abilities further!

General Questions

1. Name some typical communications protocols.
 2. How does an AD590 operate?
 3. There are eight relay outputs on a particular analyzer; what parameters are they assigned to? (use your industrial background to speculate as to what they might be)
 4. What are calibration constants?
 5. What can you use to reflect a collimated light beam?
 6. What does ASTM stand for?
 7. What are the names of the opacity measuring scales?
 8. You should always do what before tweaking something?
 9. How much pressure is 10" H₂O?
 10. A particular analyzer has three analog outputs; what might they be assigned to? (use your industrial background to speculate as to what they might be)
 11. 12 mADC represents what PV on a 0-100% scale?
 12. 12 mADC represents what PV on a 0-90% scale?
 13. Write out a formula that allows you to figure out any PV based on the mADC analog signal.
 14. Name four types of thermocouples (there are more than four).
 15. Talk about differential pressure measurements ... how do we create a DP? What physics principle is usually employed? What formula describes the relationship of flow to DP?
 16. On a Microsoft Windows based computer, what does Control-C do? How about Control-V?
 17. On a Microsoft Windows based computer, how do you take a picture of the screen?
 18. On a Microsoft Windows based computer and using Microsoft Excel, write a cell formula in A2 that displays the text "Out Of Compliance" when cell A1 on your sheet is greater than or equal to 2.0000. For all other conditions the cell formula should display "Pass". You earn extra points if you can also change the color of the font & background based on the cell's result.
 19. What is PID control?
 20. What is a P&ID?
 21. In computer programming, what does BASIC stand for?
 22. What is SCRAM? (Or what is a scram?)
 23. Draw a block diagram that shows how an analog signal could get from a local sensor (it can be anything from pressure, flow, temperature ... just assume one) to a DCS screen two miles away.
 24. What is a center-rail device?
 25. How high up can you work without fall protection?
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26. You're talking with the customer and your cell phone rings, what do you do?
27. Be prepared to show examples of your writing ability. Define/describe the following words: it's, its, their, they're, there, your, you're, potable, mischievous.
28. Build a voltage divider (on paper); create a node that will deliver 7.0 VDC @ 100 mA. Assume the source is 15.00 VDC capable of delivering 30 amps.
29. What are the basic steps to calibrating just about any industrial analyzer or transmitter?
30. What are the four forces on an airplane (in flight)?
31. What does "fax" stand for?
32. You're taking apart an analyzer, and you discover that one screw head is tough to get to. Do you: [a] work around it, [b] get a more appropriate tool for the task, or [c] step back and re-evaluate.
33. You're taking apart an analyzer, and you discover that you don't seem to have the right tool to remove this widget. Do you: [a] work around it, [b] get a more appropriate tool for the task, or [c] step back and re-evaluate.
34. Name the legs of a standard transistor.
35. Make a truth table for OR, NOR, Exclusive OR, AND, and NAND gates.
36. What is a SSR?
37. What is a SCR? (two or more possible answers)
38. My circuit requires a capacitor with the following specifications: 100 μ F, 16 VDC, radial, \pm 10%. We have the following in stock:
 - 100 μ F, 10 VDC, radial, \pm 5%
 - 100 μ F, 50 VDC, radial, \pm 10%
 - 100 nF, 16 VDC, radial, \pm 10%Which one(s) might work?
39. If one box of Jell-O mix makes one quart of Jell-O, how many boxes of Jell-O mix will it take to fill a one gallon container? (Hint: the answer is surprising)
40. Describe at least two ways to measure a mADC current loop.

Questions specific to the gas/emissions industry

41. What is HART?
 42. When was the EPA created? Under which president?
 43. What does CEMS stand for?
 44. What does COMS stand for (with respect to EPA lingo)?
 45. What flexible material(s) are resistant to acid?
 46. Describe a TCD.
 47. Describe a THC analyzer.
 48. Describe how to measure CO₂ in a standard, one species, industrial gas analyzer.
 49. Describe liquid crystal glass ... how does it work.
 50. An old pressure switch sensing circuit uses 120 VAC to monitor the contacts' status (i.e., open or closed). Why doesn't the closing of the pressure switch cause the integrated inline fuse (0.25 amps) to blow (i.e., open)?
 51. How much CEMS or COMS downtime does the EPA allow before potentially imposing warnings or fines?
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