

OCCRA PRE-TEST 2017

Students: thank you for participating in the first-ever OCCRA pre-test! This test will help us develop materials to make the OCCRA experience more valuable for years to come, AND the data from it might help us when we go to ask corporate sponsors for donations! Please answer as many questions as you can without getting help from other people or other sources of info (so, no internet, textbooks, etc.) Answer any questions that you can but please do not worry about it if you can't answer many of the questions. Put your name on *this* sheet but please Do NOT put your name on your test pages. We do want to get your name on a separate list but we would like the test to be anonymous.

STUDENT NAME _____

SCHOOL OR TEAM NUMBER _____

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A.. PNEUMATICS [For Questions 1-13, write the letter of the best answer in the blank spaces on the left.]

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|--|--------------------------------------|
| ___ 1. Devise that creates pressure by squeezing a gas | a) valve |
| ___ 2. The inner diameter of a cylinder | b) actuator |
| ___ 3. The control devices used in pneumatics | c) PSI |
| ___ 4. Any liquid or gas | d) bore |
| ___ 5. An opening that fluids flow through | e) compressor |
| ___ 6. Using pressurized gases to do work | f) double-acting cylinder |
| ___ 7. Customary unit for measuring pressure in the US | g) fluid |
| ___ 8. The maximum length travelled by the rod of a cylinder | h) port |
| ___ 9. The amount of force per unit of area | i) pressure |
| | j) pneumatics |
| | k) stroke |
| ___ 10. To calculate the extension force of a pneumatic cylinder you should: | a) divide power by pressure |
| b) multiply pressure times piston area | c) subtract the bore from the stroke |
| | d) all of these |

B. ELECTRICAL SYSTEMS

- _____ 11. The electromotive force that drives the current is commonly known as: a) amperage
b) wattage c) resistance d) voltage e) none of these are true
- _____ 12. To find the electrical power used by a motor you should; a) add the voltage and the current
b) divide the resistance by the flow c) double the current drawn d) multiply the current times the voltage
e) none of these are true
- _____ 13. The complete path followed by an electric current is known as the: a) circuit b) resistance
c) power loss d) all of these e) none of these are true
- _____ 14. When a short circuit occurs: a) there is a big increase in current b) there is a big drop in resistance
c) the conductors tend to heat up d) all of these are true e) none of these are true
- _____ 15. When trouble shooting to find a break in an electric circuit, the break will be found:
a) Where the resistance is lowest b) where the biggest voltage drop occurs c) always at the connections
d) all of these are true e) none of these are true

_____ 16. If a device has a fuse with a “20A” rating, this means: a) the device’s circuit will always have 20 amps of current flowing through it b) you must provide enough voltage so that the circuit always has at least 20 amps of current c) if more than 20 amps of current ever flows, the circuit will be broken by the fuse d) the ideal power in the device is 20A of efficiency e) none of these are true

C. MECHANICAL SYSTEMS

_____ 17. The turning strength of a motor is known as its: a) power b) torque c) rpm d) wattage e) none of these are true

_____ 18. If a motor turns a 15- tooth sprocket on its shaft, and the sprocket is chained to a 45-tooth sprocket that is mounted on a wheel and axle: a) the wheel and axle will have 3 times the rotational speed of the motor b) the wheel & axle will have one third the torque of the motor c) both of these are true d) neither of these are true

_____ 19. If a motor was not strong enough to lift a robot’s arm using a sprocket and chain system, you could: a) put a bigger sprocket on the arm’s joint b) put a smaller sprocket on the motor’s shaft c) use a spring or length of elastic to provide additional force to lift the arm d) all of these would work

_____ 20. To increase the traction of a robot’s wheels on the floor, you could: a) make the robot heavier b) shift most of the robot’s weight to one end c) oil the wheel surfaces d) all of these would work

_____ 21. If your machine tends to tip over too easily sideways, you should: a) make the base higher above the floor b) make the base wider from wheel to wheel c) make the base lighter d) all of these would work

_____ 22. To calculate the output power of a motor you would: a) multiply the motor’s torque times its rotational speed b) divide the electrical power by two c) add the power of each gear d) none of these

_____ 23. The mechanical advantage of a single-stage gearbox is found by: a) measuring the diameter of the output gear b) dividing the number of teeth in the second gear by the number of teeth in the 1st gear c) adding the total number of teeth on all gears d) all of these e) none of these

D. GENERAL INFO [Please rate each of the following by circling a number from 1 to 5; (1 = poor/not much 2 = slightly lacking 3 = OK/mediocre 4 = good 5 = very good)

My understanding of pneumatic systems	1	2	3	4	5
My understanding of electrical control systems	1	2	3	4	5
My understanding of mechanical systems	1	2	3	4	5
My ability to work effectively with others on a team	1	2	3	4	5
My ability to write computer programs	1	2	3	4	5
My understanding of what engineering and technician careers are like	1	2	3	4	5
My understanding of the design process used in engineering and my ability to follow it	1	2	3	4	5