Exam

Name_____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

1) The switch from water power to steam power caused the industrial revolution. 1) _____

2) Changes in manufacturing are driven primary by a need for increased product quality. 2) _____

3) At the start of the 20th century the electrification of manufacturing and the invention of the electric motor moved manufacturing to the next level. 3) _____

4) The process of a machine measuring the product output and automatically correcting for improper operation is call feedback control. 4) _____

5) Project type manufacturing with the many complex parts needs the greatest level of automation control. 5) _____

6) FMS stands for flexible material system and is often made up of FMCs that are linked together. 6) _____

7) Fixed automation machines are designed for a small number of products and FMCs are designed to be flexible and produce a variety of products. 7) _____

8) Software that has been thoroughly tested and used for some period of time is usually not the cause of system problems. 8) _____

9) There are two conditions when software is the source of a system problem. One of the condition is when an operator enters incorrect set points or parameters into the program. 9) _____

10) The difference between power and signal flow on a system block diagram is that signal flows from left to right and power flows from right to left. 10) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

11) Flow of signal from a block on the left to a block on the right through four other blocks is what type of signal flow? 11) _____
A) Switched path
B) Divergent
C) Linear
D) Convergent
E) Feedback

12) Flow of signal from one block to two or more other blocks is what type of signal flow? 12) _____
A) Linear
B) Divergent
C) Convergent
D) Switched path
E) Feedback

13) Flow of signal from two or more blocks into a single block is what type of signal flow? 13) _____
A) Convergent
B) Switched path
C) Linear
D) Feedback
E) Divergent

14) Flow of signal from the output back to the input is what type of signal flow? 14) _____
A) Convergent
B) Linear
C) Switched path
D) Divergent
E) Feedback

15) The term "divide and conquer" means 15) _____
A) Divide the troubleshooting tasks equally between troubleshooters.
B) Make the first measurement at the first point where a signal divides.
C) Make the first troubleshooting measurement halfway between the input and output on the signal flow path.
D) All of the above

16) In a divergent circuit the signal at the output of one of the divergent circuit is correct. What can you conclude? 16) _____
A) The problem is between the divergent input and the input of the system.
B) All divergent outputs are correct.
C) The problem is in the divergent circuit.
D) All other divergent paths must be measured before a decision.
E) No conclusions without more data

17) In a linear circuit the signal at the output is bad. The testing approach that would reduce the number of measurements is to 17) _____
A) Measure the input and then check the output of each block starting from the input.
B) Make the first measurement at the output of the block half way between the input and output.
C) Measure the signal at each block output starting at the output.
D) None of the above.

18) In a convergent circuit with three switched inputs, the signal at the output is bad when the switch is on the first convergent input. When the switch is changed to second of the convergent inputs the output is correct. What can you conclude? 18) _____
A) The switch could be bad.
B) There is a problem between the first convergent input and input to the system.
C) There is a problem between the convergent switch and the output of the system.
D) Both A and C.
E) Both A and B

19) If two symptom are present that are unrelated that means that 19) _____
A) A single component may have failed in two different circuits or modules.
B) Two component may have failed in the same circuit or module.
C) The problem is in a convergent circuit.
D) The problem is in a divergent circuit.
E) None of the above

20) When using funneling as a part of the troubleshooting process you would 20) _____
A) start with bracket narrow and move them to a wider separation.
B) start with tests that focus on replacing sub-system components and modules
C) start with tests that focus on front panel control settings.
D) start with tests that focus on measuring signals to verify the symtoms.
E) None of the above.

MATCHING. Choose the item in column 2 that best matches each item in column 1.

Match the five manufacturing categories with the description of each type.

21) Project	A) Many complex parts are used to build a one-of-a-kind product.	21) _____
22) Job shop	B) A flow of products from a manufacturing system that is never interrupted.	22) _____
23) Repetitive		23) _____
24) Line	C) A system where the delivery time required by the customer is often shorter than the total time it takes to build the product: the product has many options or models; and an inventory of subassemblies is normally present.	24) _____
25) Continuous		25) _____
	D) A system with 100 percent repeat business, multi-year contracts, high but variable production quantities.	
	E) Non-complex products with few parts and small production volume.	

Match the products in the first column with the catagories of manufacture systems that would be used to produce them.

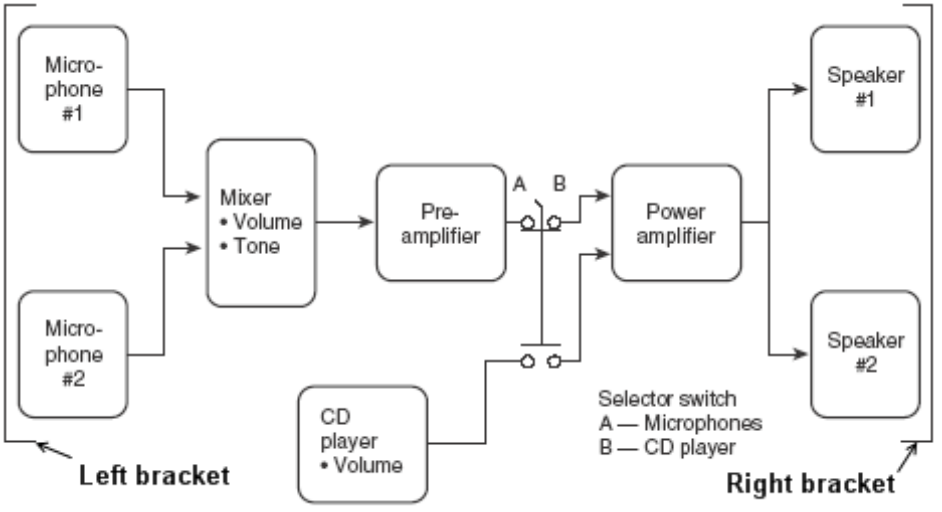
26) Space shuttle	A) Repetitive	26) _____
27) Automotive wiring harness	B) Job shop	27) _____
28) Metal supports to repair a production machine	C) Line	28) _____
	D) Project	
29) Computer printers	E) Continuous	29) _____
30) Soft drinks		30) _____

31) Men's disposalable razors — A) Line — 31) _____

32) VCR players — B) Repetitive — 32) _____

33) Electronic boards for control of microwave ovens — C) Continuous — 33) _____

Use the following signal flow diagram when matching the following information.



34) With power applied to the system, no sound is heard from either speaker when both microphones are used.

35) When switch is changed (position B) to connect the CD player into system both speakers work.

36) With right bracket at the output of the pre-amplifier, no output at the pre-amplifier is detected by a meter, but there is a signal present at the input to the pre-amplifier.

37) When switch is changed (position B) to connect the CD player into system no sound comes from either speaker.

A) Move the left bracket to the input of the pre-amplifier - the fault is in the pre-amplifier. — 34) _____

B) Right bracket moves to output of pre-amplifier — 35) _____

C) Current braket location

D) Left bracket moves to input side of the power amplifier. — 36) _____

37) _____

38) When power is applied to the system with the selector switch in position B, a CD in the player, the play mode selected and the volumn increased, no sound comes from either speaker.

39) With the left bracket on the left side of the CD player box, the selector switch is placed into position A. When either microphone is used, both speaker perform normally.

40) Without additional testing the right bracket can be moved to the input side of each speaker.

A) Put the left bracket on the left side of the CD player box.

B) Move the right bracket to the right side of the CD player box. The fault is in the CD player.

C) The assumption of only single faults means two separate devices cannot fail at the same time.

38) _____

39) _____

40) _____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

41) A discrete device is one that has only two states, on and off. 41) _____

42) The mechanical device used to change the state of a switch is called the pole. 42) _____

43) Switches designated for electronic circuit applications are not designed to switch medium to high power. 43) _____

44) Electronic duty switch contacts are designed to switch high currents and pilot duty contacts are more suited for switching very small current levels. 44) _____

45) When a toggle switch is in the off position, the NO contacts are an open circuit and the NC contacts are shorted. 45) _____

46) A DPDT switch contact configuration would have two poles, two NC contacts, and two NO contacts. 46) _____

47) The term "throw" in a switch designation indicates if the switch has only a NO or if the switch has both NO and NC contacts. 47) _____

48) Mercury switches are useful in applications where the switching force available is very small. 48) _____

49) Limit switches have double break contacts in most cases. 49) _____

50) The operator must be held in the on position for maintain contact type switches to have their NO contacts shorted. 50) _____

51) Industrial selector switches are similar to electronic rotary switches. 51) _____

52) Selector switches are used to switch medium to high currents in industrial applications. 52) _____

53) Limit switches come with either a side lever operator or with a side plunger. 53) _____

54) The held open limit switch symbol is used for normally open contacts that are held open by the process. 54) _____

55) The angle on a limit switch trip dog is a function of the velocity of the object that makes contact with the limit switch lever or plunger. 55) _____

56) Relays usually have the same pull in and drop out current. 56) _____

57) Commercial and industrial relays generally have the same contact configurations as switches. 57) _____

58) Relays with reed and mercury wetted contacts have the lowest contact resistance. 58) _____

59) On delay type time delay relays close NO contacts when power is applied and keep the contacts closed for a specified time delay. 59) _____

60) The instantaneous contacts on a time delay relay operate like NO and NC contacts would on a control relay. 60) _____

61) Contactors are relays used to switch high current and high power devices like motors. 61) _____

62) Contactors have thermal overloads built into the switching device. 62) _____

63) Three wire control just identifies the number of wires between the contactor and the control push buttons. 63) _____

64) Contactor auxiliary contacts are used in the control circuit to protect the load from overload currents. 64) _____

65) Contactor overload contacts are used in the motor power circuit to protect the motor from overload currents. 65) _____

66) Switch problems can be grouped into two categories, problems with the operator and problems with the contacts. 66) _____

67) Relay problems fall into the same two groups as switch problems, namely operators and contacts. 67) _____

68) If two loads with different voltage levels had to be switched with a single break type device, you would have to choose a switch that had a minimum of two poles. 68) _____

69) If it is necessary to switch a load current of 50 mA, then the contacts must have a good dry circuit rating and the switch must be rated for electronic duty. 69) _____

70) If the position of an object oscillates about the switching point, then you need a position sensing switch with snap action and mercury wetted contacts. 70) _____

71) The inrush current is higher than the sealed current for a relay because the air gaps are larger and the armature is made of laminated metal. 71) _____

72) If a motor must start 15 seconds after the start switch is pressed, and a motor run light must come on when the start switch is pressed, then an on-delay type time delay relay must be used with one set of instantenous contacts. 72) _____

73) The three-wire control circuit for a motor has a momentary stop (NC) and start (NO) push button, motor contactor, and overload contacts wired in series, and an auxiliary contact connected across the stop push button contacts. 73) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

74) An industrial selector switch would most often have: 74) _____
A) a good dry circuit rating.
B) double break contacts.
C) a push button operator.
D) more than three positions for the operator.

75) The type of switch used to separate the motor and its control circuit from main power is a: 75) _____
A) limit switch.
B) control relay.
C) drum controller.
D) disconnect.
E) selector.

76) Which of the following parts are NOT a component in a lever type limit switch? 76) _____
A) Lever
B) Operating head
C) Switch body
D) Contact rotator
E) Receptacle

77) Which of the following components are NOT found in a typical motor starter. 77) _____
A) Auxiliary contact
B) Overload contacts
C) Motor contacts
D) Coil
E) Start switch

78) Which of the following components are NOT a part used in a relay? 78) _____
A) Armature
B) Stationary contacts
C) Magnet
D) Spool valve
E) Coil

79) Which of the following is true for a 30 second on delay type time delay relay 10 seconds after power applied to the coil? 79) _____
A) The instantaneous contacts are open.
B) The NC contacts are open.
C) The NO contacts are open.
D) The relay coil is not energized.
E) All of the above

80) Which of the following is true for a 30 second on delay type time delay relay 40 seconds after power applied to the coil? 80) _____

A) The instantaneous contacts are open.
B) The NO contacts are closed.
C) The NC contacts are closed.
D) The coil is not energized.
E) None of the above.

81) Which of the following components are NOT used to build a four-way double acting pneumatic control valve. 81) _____

A) Piston rod
B) Soleniod
C) Spring
D) Spool
E) None of the above

82) The device pictured above is a _____ type. 82) _____

A) Toggle switch
B) Rocker switch
C) Push button switch
D) Selector switch
E) None of the above

83) The device pictured above is a _____ type. 83) _____

A) Drum switch
B) Push button switch
C) Selector switch
D) Rocker switch
E) None of the above

84) The device pictured above is a _____ type. 84) _____

A) Selector switch
B) Limit switch
C) Rocker switch
D) Rotary switch
E) None of the above

85) The device pictured above is a _____ type. 85) _____

A) Unguarded push button switch
B) Mushroom push button switch
C) Wobble stick switch
D) Guarded push button switch
E) None of the above

86) The device pictured above is a _____ type. 86) _____

A) Guarded push button switch
B) Unguarded push button switch
C) Toggle switch
D) Selector switch
E) None of the above

87) The device pictured above is a _____ type. 87) _____

A) Toggle switch
B) Selector switch
C) Pointer switch
D) Wobble stick switch
E) None of the above

88) The device pictured above is a _____ type. 88) _____

A) Unguarded push button switch
B) Guarded push button switch
C) Mushroom push button switch
D) Pilot light
E) None of the above

89) The device pictured above is a _____ type. 89) _____

A) Selector switch
B) Wobble stick switch
C) Rocker switch
D) Toggle switch
E) None of the above

90) The device pictured above is a _____ type. 90) _____

A) Toggle switch
B) Push wheel switch
C) Rocker switch
D) Wobble stick switch
E) None of the above

91) The device pictured above is a _____ type. 91) _____

A) Slide switch
B) Toggle switch
C) Push button switch
D) Rocker switch
E) None of the above

92) The device pictured above is a _____ type. 92) _____

A) Rocker switch
B) Wobble stick switch
C) Toggle switch
D) Push button switch
E) None of the above

93) The device pictured above is a _____ type. 93) _____

A) Rotary switch
B) Toggle switch
C) Push button switch
D) Selector switch
E) None of the above

94) The devices pictured above are _____. 94) _____

A) Drum switches
B) Toggle switches
C) Rocker switches
D) Limit switches
E) None of the above

95) The device pictured above is a _____ type. 95) _____

A) Selector switch
B) Limit switch
C) Drum switch
D) Toggle switch
E) None of the above

96) The device pictured above is a _____ switch. 96) _____

A) Temperature
B) Differential pressure
C) Flow
D) Level
E) None of the above

97) The device pictured above is a _____ switch. 97) _____

A) Vacuum
B) Level
C) Differential pressure
D) Temperature
E) None of the above

98) The device pictured above is a _____ switch. 98) _____

A) Temperature
B) Level
C) Flow
D) Differential pressure
E) None of the above

99) The device pictured above is a _____ relay. 99) _____

A) Commercial closed
B) Industrial contactor
C) Commercial open
D) Industrial control
E) None of the above

100) The device pictured above is a _____ relay. 100) _____

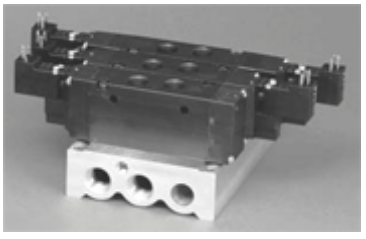
A) Commercial open
B) Industrial control
C) Commercial closed
D) Industrial contactor
E) None of the above

101) The device pictured above is a _____ relay. 101) _____

A) Commercial open
B) Commercial closed
C) Industrial contactor
D) Industrial control
E) None of the above

102) The device pictured above is a _____ relay. 102) _____

A) Industrial control
B) Industrial contactor
C) Commercial closed
D) Commercial open
E) None of the above

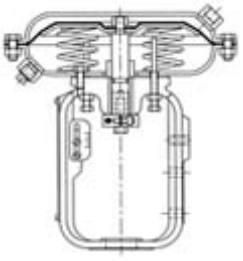


103) The device pictured above is a _____. 103) _____

A) Pneumatic valve
B) Industrial valve with pneumatic acturator
C) Pneumatic valve with manifold
D) Pneumatic valve actuator
E) None of the above

104) The device pictured above is a _____. 104) _____

A) Industrial valve with pneumatic acturator
B) Pneumatic valve
C) Pneumatic valve actuator
D) Pneumatic valve with manifold
E) None of the above



105) The device pictured above is a _____. 105) _____

A) Pneumatic valve actuator
B) Pneumatic valve
C) Industrial valve with pneumatic acturator
D) Pneumatic valve with manifold
E) None of the above

Answer Key
Testname: UNTITLED1

1) TRUE
2) FALSE
3) TRUE
4) TRUE
5) FALSE
6) FALSE
7) TRUE
8) TRUE
9) TRUE
10) FALSE
11) C
12) B
13) A
14) E
15) C
16) B
17) B
18) E
19) A
20) E
21) A
22) E
23) D
24) C
25) B
26) D
27) A
28) B
29) C
30) E
31) C
32) A
33) B
34) C
35) B
36) A
37) D
38) A
39) B
40) C
41) TRUE
42) FALSE
43) TRUE
44) FALSE
45) TRUE
46) TRUE
47) FALSE
48) TRUE
49) TRUE
50) TRUE

51) TRUE
52) TRUE
53) FALSE
54) FALSE
55) TRUE
56) FALSE
57) TRUE
58) TRUE
59) FALSE
60) TRUE
61) TRUE
62) TRUE
63) TRUE
64) FALSE
65) FALSE
66) TRUE
67) FALSE
68) TRUE
69) TRUE
70) FALSE
71) FALSE
72) TRUE
73) FALSE
74) B
75) D
76) D
77) E
78) D
79) C
80) B
81) A
82) C
83) C
84) E
85) B
86) A
87) D
88) D
89) D
90) E
91) D
92) E
93) A
94) D
95) C
96) B
97) A
98) A
99) C
100) D

Answer Key
Testname: UNTITLED1

101) D
102) C
103) C
104) A
105) A