Registration Form

PUMPING PRINCIPLES CEU COURSE $200.00

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You will have 90 days from this date in order to complete this course

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I have read and understood the disclaimer notice on page 2. Digitally sign XXX

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List hours worked on assignment must match State Requirement. _____

Your certificate will be emailed to you in about two weeks.

Please circle/check which certification you are applying the course CEU's.
Water Treatment ___ Water Distribution ___ Other _____

Collections ___ WWT___ Well Operator ___ Pump Installer____

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Technical Learning College TLC PO Box 3060, Chino Valley, AZ 86323
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You can obtain a printed version of the course manual from TLC for an additional $69.95 plus shipping charges.

AFFIDAVIT OF EXAM COMPLETION

I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

Grading Information

In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

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Pumping Principles Answer Sheet

Name _____

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You are solely responsible in ensuring that this course is accepted for credit by your State. <u>No refunds.</u> Did you check with your State agency to ensure this course is accepted for credit?

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PA DEP Students are required to complete the original version of the text. _____
Please initial

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Please circle only one answer per question or X, underline, bold or circle it

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Please fax or e-mail the answer key to TLC
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If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of $50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line.

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Please e-mail or fax this survey with your final exam

Pumping Principles CEU Course
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Pumping Principles CEU Training Course Assignment

The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e- mail it back to TLC.

You will have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your answer key and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular**. **Multiple Choice Section. One answer per question and please use the answer key.**

Early Development of Hydraulics

1. Which of the following terms to be made effective for practical applications, it was necessary to have a piston that "fit exactly?"

A. Pascal's law
B. Evangelista Torricelli
C. Blaise Pascal
D. Aristotle' law
E. Archimedes' law
F. None of the Above

2. _____ states that increase in pressure on the surface of a confined fluid is transmitted undiminished throughout the confining vessel or system?

A. Pascal's law
B. Evangelista Torricelli
C. Blaise Pascal
D. Aristotle' law
E. Archimedes' law
F. None of the Above

3. The mercury column was held up by horror vacui as Aristotle had supposed.

A. True B. False

Pascal's Law- Introduction

4. Pascal discovered that pressure in a fluid acts equally in some directions.

A. True B. False

5. According to the text, pressure acts at right angles to the containing surfaces.

A. True B. False

6. If a pressure gauge, with an exposed face, is placed beneath the surface of a liquid at a specific depth and pointed in different directions, the pressure will read the same.

A. True B. False

7. Pressure in a _____of direction.

A. Modern hydraulics
B. Liquid at a specific depth
C. Liquid is independent
D. Weight of a liquid
E. Height of a liquid
F. None of the Above

8. Pressure due to the _____, at any level, depends on the depth of the fluid from the surface.

A. Modern hydraulics D. Weight of a liquid
B. Liquid at a specific depth E. Height of a liquid
C. Liquid is independent F. None of the Above

9. If the exposed face of the pressure gauges are moved closer to the surface of the liquid, the indicated?

A. Depth is doubled D. Column is tripled
B. Pressure will be less E. Is equal
C. Pressure of a liquid F. None of the Above

10. _____ produces the pressure is referred to as the fluid head of the liquid?

A. Depth is doubled D. Volume of a liquid
B. Pressure will be less E. Is equal
C. Pressure of a liquid F. None of the Above

11. Which of the following terms is due to its fluid head is also dependent on the density of the liquid?

A. Depth is doubled D. Volume of a liquid
B. Pressure will be less E. Is equal
C. Pressure of a liquid F. None of the Above

Static Pressure

12. Static pressure exists in addition to gravity may be present at the same time.

A. True B. False

13. Pascal's law states that a pressure set up in a fluid acts equally in all directions and at right angles to the containing surfaces.

A. True B. False

14. Pascal's law covers the situation only for fluids at rest or practically at rest. It is true only for the factors making up this missing term.

A. Pressure drop D. Speed
B. Velocity of flow E. Static head
C. Volume of a liquid F. None of the Above

15. When velocity becomes a factor it must have a direction, the force related to the velocity must also have a direction, so that Pascal's law alone does not apply to the dynamic factors of?

A. Pressure drop D. Fluid power
B. Velocity of flow E. Static head
C. Volume of a liquid F. None of the Above

16. The dynamic factors of inertia and friction are related to the static factors. Velocity head and _____ are obtained at the expense of static head.

A. Pressure drop D. Fluid power
B. Friction head E. Static head
C. Volume of a liquid F. None of the Above

17. _____ can be produced by pressure or head when dealing with fluids?
A. Pressure drop D. Fluid power
B. Velocity of flow E. Static head
C. Force F. None of the Above

Volume and Velocity of Flow

18. Which of the following flow terms is passing a point in a given time is known as its volume of flow or flow rate?
A. Pressure drop D. Velocity of flow
B. Friction head E. Volume of flow
C. Volume of a liquid F. None of the Above

19. _____ is usually expressed in gallons per minute (gpm) and is associated with relative pressures of the liquid, such as 5 gpm at 40 psi?
A. Pressure drop D. Velocity of flow
B. Friction head E. Volume of flow
C. Volume of a liquid F. None of the Above

20. Which of the following flow terms is defined as the average speed at which the fluid moves past a given point? It is usually expressed in feet per second (fps) or feet per minute (fpm).
A. Pressure drop D. Velocity of flow
B. Friction head E. Volume of flow
C. Volume of a liquid F. None of the Above

21. _____ is an important consideration in sizing the hydraulic lines?
A. Pressure drop D. Velocity of flow
B. Friction head E. Volume of flow
C. Volume of a liquid F. None of the Above

22. Volume and friction head are often considered together, that is, with volume of input unchanged—the velocity of flow increases as the cross section or size of the pipe decreases.
A. True B. False

Bernoulli's Principle

23. Bernoulli's principle thus says that a rise (or fall) in pressure in a flowing fluid must always be accompanied by a decrease (or increase) in the speed, and conversely, if an increase (decrease) in, the speed of the fluid results in a decrease (or increase) in the pressure.
A. True B. False

24. Bernoulli’s principle is responsible for the fact that a shower curtain gets “sucked inwards" when the water is first turned on. What happens is that the increased water/air velocity inside the curtain (relative to the still air on the other side) causes a pressure drop.
A. True B. False

25. Which of the following terms explains the difference between the outside and inside - causes a net force on the shower curtain which sucks it inward?
A. Pressure D. Velocity of flow
B. Friction head E. Volume of flow
C. Volume of a liquid F. None of the Above

26. Squeezing the bulb over the fluid creates a low _____ area due to the higher speed of the air, which subsequently draws the fluid up.
A. Pressure D. Velocity of flow
B. Friction head E. Volume of flow
C. Volume of a liquid F. None of the Above

Section 4 - Fluid Mechanics and Hydraulic Principles- Introduction
Hydraulics
27. Hydraulics is applied commonly to the study of _____, other liquids, and even gases when the effects of compressibility are small.
A. Fluids D. Mechanical properties of water
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above

28. Hydraulics can be divided into two areas, _____ and hydrokinetics.
A. Fluids D. Mechanical properties of water
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above

29. Which of the _____ is about the pressures exerted by a fluid at rest.
A. Pressure D. Hydraulics
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above

30. Which of the following terms is an excellent example of deductive mathematical physics, and in which the predictions agree closely with experiment?
A. Pressure D. Hydraulics
B. Hydrostatics E. Flow
C. Hydrokinetics F. None of the Above

Section 5 - Fluid/Hydraulic Forces & Pressures Introduction
Atmospheric Pressure
31. According the text, if a column of air 1-inch square extending all the way to the "atmosphere", this column of air would weigh approximately 2.31 pounds at sea level.
A. True B. False

32. _____ at sea level is approximately 14.7 psi?
A. Static pressure D. Bottom
B. Pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

33. If you were to ascend, the atmospheric pressure increases by approximately 1.0 psi for every 2,343 feet.
A. True B. False

34. Which of the following terms if you could be below, example- in excavations and depressions, atmospheric pressure increases?
A. Static pressure D. Sea level
B. Pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

Barometric Loop
35. According to the text, the barometric loop, will provide protection against backsiphonage, is based upon the principle that a water column, at sea level pressure, will not rise above 33.9 feet. In general, barometric loops are locally fabricated, and are 35 feet high.
A. True B. False

36. _____ could be measured an absolute scale, pounds per square inch absolute (psia), or gauge scale, (psiag).
A. Static pressure D. Sea level
B. Pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

37. Absolute pressure is equal to gauge pressure plus the atmospheric pressure.
A. True B. False

38. The barometric loop consists of a continuous section of supply piping that abruptly rises to a height of approximately 233 feet and then returns back down to the originating level.
A. True B. False

39. The barometric loop is a loop in the piping system that effectively protects against backpressure.
A. True B. False

40. Gauge pressure is simply the pressure read on the gauge. If there is no pressure on the gauge other than atmospheric, the gauge will read zero.
A. True B. False

41. Which of the following terms would be equal to 14.7 psi, which is the atmospheric pressure?
A. Static pressure D. Sea level
B. Absolute pressure E. Atmospheric pressure
C. Gauge pressure F. None of the Above

Pressure
42. Water is incompressible, while air is very compressible.
A. True B. False

43. Both air and water are considered to be_____.
A. Absolute pressure D. Volume
B. Atmospheric pressure E. Shearing force
C. Fluid(s) F. None of the Above

44. Which of the following terms does water possess but air does not?
A. Absolute pressure
B. Atmospheric pressure
C. Fluid(s)
D. Volume
E. Shearing force
F. None of the Above

45. A fluid is a substance that cannot exert any permanent forces tangential to a boundary and any force that it exerts on a boundary must be normal to the boundary.
A. True B. False

46. According to the text, a force is proportional to the_____, and is called a pressure.
A. Pascal's Principle
B. Hydrostatics
C. Acting on the body of the fluid
D. Permanent forces tangential
E. Area on which it is exerted
F. None of the Above

47. In order for the fluid to be in equilibrium, the pressure must be the same in all directions (or the element would move in the direction of least pressure), and if no other forces are?
A. Pascal's Principle
B. Hydrostatics
C. Acting on the body of the fluid
D. Permanent forces tangential
E. Area on which it is exerted
F. None of the Above

48. _____ does water and air have; that is, layers of them slide very easily on one another?
A. Low viscosity
B. Atmospheric pressure
C. Fluid(s)
D. Volume
E. Shearing force
F. None of the Above

49. Which of the following terms that if a certain volume of fluid were somehow made solid, the equilibrium of forces would not be disturbed?
A. Axiom
B. Gravitational body force
C. Pressure
D. Displaced fluid
E. Gravitation
F. None of the Above

50. Which of the following terms is an example of a body force that disturbs the equality of pressure in a fluid?
A. Axiom
B. Gravitational body force
C. Pressure
D. Displaced fluid
E. Gravitation
F. None of the Above

51. When the barometric equation is integrated, we find the variation of pressure with_____.
A. Height or depth
B. Gravitational body force
C. Pressure
D. Displaced fluid
E. Gravitation
F. None of the Above

Free Surface Perpendicular to Gravity

52. Archimedes' Principle says that the buoyant force is equal to the weight of the displaced fluid, and passes through the center of mass of_____.

A. Axiom
B. Gravitational body force
C. Pressure
D. Displaced fluid
E. Gravitation
F. None of the Above

Standard Atmospheric Pressure

53. Which of the following terms is a practice that is conveniently used to measure pressure differences by measuring the height of liquid columns?

A. Barometer measurement
B. Total vacuum
C. Capillarity
D. Partial vacuum measurement
E. Manometer
F. None of the Above

54. _____ uses a partially evacuated chamber of thin metal that expands and contracts according to the external pressure?

A. Aneroid barometer
B. Total vacuum
C. Capillarity tube
D. Partial vacuum
E. Barometric loop
F. None of the Above

Vacuum

55. The term vacuum indicates that the absolute pressure is less than the atmospheric pressure and that the _____ is negative.

A. Static pressure
B. Pressure
C. Gauge pressure
D. Total vacuum
E. Atmospheric pressure
F. None of the Above

56. Which of the following terms would mean a pressure of 0 psia or –14.7 psig?

A. Static pressure
B. Pressure
C. Gauge pressure
D. Total vacuum
E. Atmospheric pressure
F. None of the Above

57. According to the text, it is impossible to produce a partial vacuum.

A. True B. False

58. Which of the following terms the pressure can range from slightly less than 14.7 psia to slightly greater than 0 psia?

A. Static pressure
B. Pressure
C. Gauge pressure
D. Total vacuum
E. Partial vacuum
F. None of the Above

59. Backsiphonage results from _____ exerted on a liquid, forcing it toward a supply system that is under a vacuum.

A. Static pressure
B. Pressure
C. Gauge pressure
D. Atmospheric pressure
E. Partial vacuum
F. None of the Above

Water Pressure

60. The weight of a cubic foot of water is 62.4 pounds per square foot. The base can be subdivided into 144-square inches with each subdivision being subjected to a pressure of 0.433 psig. This is one of our key foundation for backflow prevention.
A. True B. False

61. Which of the following terms are normally stated in terms of the height of a fluid?
A. Friction D. Siphon
B. Weight E. Depth
C. Pressure(s) F. None of the Above

62. Water with a pressure head of 10 ft can provide the same _____as an equal amount of water raised by 10 ft.
A. Friction D. Siphon
B. Weight E. Energy
C. Pressure(s) F. None of the Above

63. Water flowing in a pipe is subject to head loss because of_____.
A. Friction D. Siphon
B. Weight E. Energy
C. Pressure(s) F. None of the Above

Pressure and Force

64. Which of the following terms is the force that pushes water through pipes?
A. Absolute pressure D. Volume
B. Pressure E. Shearing force
C. Fluid(s) F. None of the Above

65. Water pressure determines the flow of water from the tap.
A. True B. False

66. _____ and force are used extensively in the study of fluid power?
A. Absolute pressure D. Volume
B. Pressure E. Shearing force
C. Fluid(s) F. None of the Above

67. Which of the following terms means a total push or pull. It is the push or pull exerted against the total area of a particular surface?
A. Absolute pressure D. Volume
B. Pressure E. Force
C. Fluid(s) F. None of the Above

68. _____ means the amount of push or pull applied to each unit area of the surface?
A. Absolute pressure D. Volume
B. Pressure E. Force
C. Fluid(s) F. None of the Above

69. Which of the following terms maybe exerted in one direction, in several directions, or in all directions?

A. Absolute pressure
B. Pressure
C. Fluid(s)
D. Volume
E. Force
F. None of the Above

Computing Force, Pressure, and Area

70. A formula is used in computing force, volume, and area in fluid power systems. In this formula, P refers to pressure, F indicates volume, and A represents area.

A. True B. False

Section 6- Pumps and Pumping Water - Introduction

71. Here are the important points to consider about suction piping when the liquid being pumped is below the level of the pump: Sometimes suction lift is also referred to as 'positive suction head'.

A. True B. False

72. According to the text, suction lift is when the level of water to be pumped is below the?

A. Impeller
B. Suction
C. Lift water
D. Centerline of the pump
E. Bellows
F. None of the Above

73. According to the text, the ability of the pump to lift water is the result of a partial vacuum created at the?

A. Partial vacuum
B. Suction lift
C. Center of the pump
D. Pressure differential
E. Negative suction head
F. None of the Above

74. The suction side of pipe should be one diameter smaller than the pump inlet.

A. True B. False

75. The required eccentric reducer should be turned so that the top is flat and the bottom tapered.

A. True B. False

The Basic Water Pump –Pump Operation

76. According to the text, the centrifugal pumps work by spinning water around in a circle inside a?

A. Vortex
B. Cylinder
C. Viscous drag pump
D. Center of the impeller
E. Cylindrical pump housing
F. None of the Above

77. The pump makes the water spin by pulling it with an impeller.

A. True B. False

78. The blades of this impeller project inward from an axle like the arms of a turnstile and, as the impeller spins, the water moves through it.

A. True B. False

79. In a centrifugal pump, the water pressure at the edge of the turning impeller rises until it is able to keep water circling with the_____.
A. Centrifugal pump(s) D. Diaphragm pump(s)
B. Impeller blade(s) E. Cylindrical pump housing
C. Bernoulli's equation F. None of the Above

80. In a centrifugal pump, as water drifts outward between the _____ of the pump, it must move faster and faster because its circular path is getting larger and larger.
A. Centrifugal pump(s) D. Diaphragm pump(s)
B. Impeller blade(s) E. Cylindrical pump housing
C. Bernoulli's equation F. None of the Above

81. As the water slows down and its kinetic energy decreases, that water's pressure potential energy increases.
A. True B. False

Types of Pumps
82. The family of pumps comprises a large number of types based on application and capabilities. The two major groups of pumps are_____.
A. Plunger and bicycle pump D. Discharge and radical displacement
B. Mixed flow and single E. Dynamic and positive displacement
C. Dynamic and radical F. None of the Above

Centrifugal pumps are classified into three general categories:
83. Which of the following terms is a centrifugal pump in which the pressure is developed wholly by centrifugal force?
A. Cylinder D. Cavity
B. Chamber E. Positive Displacement Pump(s)
C. Radial flow F. None of the Above

84. _____ is a centrifugal pump in which the pressure is developed partly by centrifugal force and partly by the lift of the vanes of the impeller on the liquid.
A. Plunger pump D. Discharge tube
B. Mixed flow E. Roots blower
C. Dynamic F. None of the Above

85. Which of the following terms is a centrifugal pump in which the pressure is developed by the propelling or lifting action of the vanes of the impeller on the liquid?
A. Axial flow D. Cavity
B. Chamber E. Positive Displacement Pump(s)
C. Radial flow F. None of the Above

Positive Displacement Pumps
86. A Positive Displacement Pump has an expanding cavity on the _____of the pump and a decreasing cavity on the discharge side.
A. Plunger pump D. Discharge tube
B. Suction side E. Roots blower
C. Dynamic F. None of the Above

87. According to the text, liquid is allowed to flow into the pump as the cavity on the suction side expands and the liquid is forced out of the_____.
A. Cylinder D. Cavity
B. Chamber E. Discharge
C. Radial flow F. None of the Above

88. This principle applies to all types of Positive Displacement Pumps whether the pump is a rotary lobe, gear within a gear, piston, diaphragm, screw, and_____.
A. Plunger pump D. Progressing cavity
B. Mixed flow E. Roots blower
C. Dynamic F. None of the Above

89. A Positive Displacement Pump, unlike a Centrifugal Pump, will produce the same flow at a given RPM no matter what the discharge pressure is.
A. True B. False

90. Which of the following terms cannot be operated against a closed valve on the discharge side of the pump?
A. Bicycle D. Centrifugal
B. Bellows E. Positive displacement pump(s)
C. Radial flow F. None of the Above

91. If a Positive Displacement Pump is allowed to operate against a closed discharge valve it will continue to produce flow - this will increase the pressure in the discharge line until either the line bursts or the pump is severely damaged or both.
A. True B. False

Plunger Pump
92. The plunger pump cannot be used for heavy sludge.
A. True B. False

93. The plunger pump is a positive displacement pump that uses a _____to force liquid from the suction side to the discharge side of the pump.
A. Plunger pump D. Discharge tube
B. Mixed flow E. Plunger or piston
C. Dynamic F. None of the Above

94. According to the text, the movement of the plunger or piston inside the pump creates pressure inside the pump, never operated against any_____.
A. Inward force D. Closed discharge valve
B. Pump pushes E. Incompressible fluid
C. Viscous drag pump F. None of the Above

95. Which of the following terms must be open before the pump is started, thus preventing any fast build-up of pressure that could damage the pump?
A. Inward force D. Center of the impeller
B. Discharge valves E. Incompressible fluid
C. Viscous drag pump F. None of the Above

Diaphragm Pumps

96. _____ provides the mechanical action used to force liquid from the suction to the discharge side of the pump.

A. Centrifugal pump(s)
B. Impeller blade(s)
C. Bernoulli's equation
D. Diaphragm
E. Cylindrical pump housing
F. None of the Above

97. Which of the following terms has an advantage that this pump does not come in contact with moving metal?

A. Plunger pump
B. Mixed flow
C. Dynamic
D. Diaphragm
E. Plunger or piston
F. None of the Above

Pump Categories

98. The key to understanding a pumps operation is that a pump is to move water and generate the _____ we call pressure.

A. Centrifugal pump(s)
B. Impeller blade(s)
C. Delivery force
D. Diaphragm pump(s)
E. Cylindrical pump housing
F. None of the Above

99. Pump operation like with a centrifugal pump — pressure is not referred to in pounds per square inch but rather as the equivalent in elevation, called?

A. Inward force
B. Head
C. Viscous drag pump
D. Center of the impeller
E. Incompressible fluid
F. None of the Above

100. According to the text, pumps may be classified based on the application they serve.

A. True
B. False

101. According to the text, all pumps may be divided into two major categories: (1) dynamic and (2)?

A. Centrifugal
B. Impeller
C. Displacement
D. Diaphragm
E. Rotary
F. None of the Above

Common Types of Water Pumps

102. The water production well industry almost exclusively uses turbine pumps, which are a type of centrifugal pump.

A. True
B. False

103. The most common type of water pumps used for municipal and domestic water supplies are?

A. Axial flow
B. Submersible
C. Rotary pump
D. Turbine pump(s)
E. Variable displacement pumps
F. None of the Above

104. _____ will produce at different rates relative to the amount of pressure or lift the pump is working against.

A. Variable displacement pump
B. Drive shaft
C. Column pipe
D. Single or multiple bowls
E. Pump's lifting capacity
F. None of the Above

105. Impellers are rotated by the pump motor, which provides the _____ needed to overcome the pumping head.

A. Spider bearing(s)
B. Horsepower
C. Impeller(s)
D. Turbine pump(s)
E. Desired pumping rate
F. None of the Above

106. The size and number of stages, horsepower of the motor and _____are the key components relating to the pump's lifting capacity.

A. Pumping head
B. Drive shaft
C. Column pipe
D. Single or multiple bowls
E. Pump's lifting capacity
F. None of the Above

107. Which of the following terms are variable displacement pumps that are by far used the most?

A. Axial flow
B. Submersible
C. Rotary pump
D. Turbine pump(s)
E. Centrifugal pumps
F. None of the Above

108. According to the text, the turbine pump utilizes impellers enclosed in single or multiple bowls or stages to_____.

A. Lift water
B. Drive shaft
C. Column pipe
D. Single or multiple bowls
E. Pump's lifting capacity
F. None of the Above

109. Vertical turbine pumps are commonly used in groundwater wells. These pumps are driven by a shaft rotated by a motor on the surface.

A. True B. False

110. The shaft turns the impellers within the pump housing while the?

A. Spider bearing(s)
B. Horsepower turns the shaft
C. Impeller(s)
D. Water moves up the column
E. Desired pumping rate is obtained
F. None of the Above

111. The rotating shaft in a line shaft turbine is actually housed within the column pipe that delivers the water to the surface.

A. True B. False

112. The size of the _____are selected based on the desired pumping rate and lift requirements.

A. Spider bearing(s)
B. Horsepower
C. Impeller(s)
D. Column, impeller, and bowls
E. Desired pumping rate
F. None of the Above

113. According to the text, column pipe sections can be threaded or coupled together while the drive shaft is coupled and suspended within the column by?
A. Oil tube D. Single or multiple bowls
B. Spider bearings E. Pump's lifting capacity
C. Column pipe F. None of the Above

114. The water passing through the column pipe serves as the lubricant for the bearings.
A. True B. False

115. _____ provide both a seal at the column pipe joints and keep the shaft aligned within the column.
A. Spider bearing(s) D. Roller bearings
B. Keyway E. Lantern rings
C. Impeller(s) F. None of the Above

116. Some vertical turbines are lubricated by oil rather than water. These pumps are essentially the same as_____; only the drive shaft is enclosed within an oil tube.
A. Oil tube D. Single or multiple bowls
B. Water lubricated units E. Pump's lifting capacity
C. Column pipe F. None of the Above

117. The oil tube is suspended within the column by_____, while the line shaft is supported within the oil tube by brass or redwood bearings.
A. Oil tube D. Single or multiple bowls
B. Spider flanges E. Pump's lifting capacity
C. Column pipe F. None of the Above

118. A continuous supply of _____the drive shaft as it proceeds downward through the oil tube.
A. Spider bearing(s) D. Turbine pump(s)
B. Oil lubricates E. Desired pumping rate
C. Impeller(s) F. None of the Above

119. A small hole located at the top of the _____allows excess oil to enter the well. This results in the formation of an oil film on the water surface within oil-lubricated wells.
A. Pump bow unit D. Single or multiple bowls
B. Drive shaft E. Pump's lifting capacity
C. Column pipe F. None of the Above

120. Careful operation of oil lubricated turbines is needed to ensure that the pumping levels do not drop enough to allow oil to enter the pump.
A. True B. False

121. According to the text, water and oil lubricated turbine pump units can be driven by?
A. Gears D. Electric or fuel powered motors
B. Drive shaft E. Pump's lifting capacity
C. Column pipe F. None of the Above

122. Often an electric motor that is connected to the _____by a keyway and nut.
A. Drive shaft D. Sprocket
B. Rotor E. Time delay or ratchet assembly
C. Inboard F. None of the Above

123. Where electricity is not readily available, fuel powered engines may be connected to the drive shaft by a?
A. Gear D. Volumetric positive displacement
B. Lantern ring E. Right angle drive gear
C. Drive shaft F. None of the Above

124. Oil and water lubricated systems will have a strainer attached to the _____to prevent sediment from entering the pump.
A. Intake D. Lantern ring
B. Diaphragm E. Sump
C. Inboard F. None of the Above

125. Which of the following terms represents water flowing back down the column, turning the impellers in a reverse direction?
A. Vapor bubbles are created D. Volumetric positive displacement is turned off
B. Chamber pressure E. Line shaft turbine is turned off
C. Drive shaft is off F. None of the Above

126. Time delays or ratchet assemblies are often installed on these motors to either prevent the motor from turning on before _____stops or simply not allow it to reverse at all.
A. Reverse rotation D. Keyway and nut
B. Diaphragm E. Time delay or ratchet assembly
C. Inertial cavitation F. None of the Above

There are three main types of diaphragm pumps:
127. In the first type, the _____with one side in the fluid to be pumped, and the other in air or hydraulic fluid.
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Diaphragm is sealed
C. Drive shaft F. None of the Above

128. The diaphragm is flexed, causing the volume of the pump chamber to increase and decrease.
A. True B. False

129. A pair of _____prevents reverse flow of the fluid.
A. Strainers D. Non-return check valves
B. Diaphragms E. Check valves
C. Springs F. None of the Above

130. The second type of diaphragm pump works with volumetric positive displacement, but differs in that the prime mover of the diaphragm is neither oil nor air; but is?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Reverse direction
C. Electro-mechanical F. None of the Above

131. The third type of diaphragm pump has one or more springs with the fluid to be pumped on both sides.
A. True B. False

132. According to the text, when the volume of a chamber of either type of pump is increased (the diaphragm moving up), the pressure decreases, and fluid is drawn into the?
A. Chamber D. Keyway and nut
B. Diaphragm E. Time delay or ratchet assembly
C. Inertial cavitation F. None of the Above

133. _____ pressure later increases from decreased volume (the diaphragm moving down), the fluid previously drawn in is forced out?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber E. Diaphragm
C. Drive shaft F. None of the Above

134. Which of the following terms - moving up once again draws fluid into the chamber, completing the cycle?
A. Spring D. Keyway and nut
B. Diaphragm E. Time delay or ratchet assembly
C. Inertial cavitation F. None of the Above

Cavitation
135. According to the text, cavitation is defined as the phenomenon of formation of vapor bubbles of a flowing liquid in a region where the pressure of the liquid falls below its_____.
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Vapor pressure
C. Drive shaft F. None of the Above

136. Cavitation is usually divided into two classes of behavior: inertial (or transient) cavitation and?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Non-inertial cavitation
C. Drive shaft F. None of the Above

137. _____ is the process where a void or bubble in a liquid rapidly collapses, producing a shock wave?
A. Vapor bubbles D. Volumetric positive displacement
B. Chamber pressure E. Reverse direction
C. Inertial cavitation F. None of the Above

138. Which of the following terms often occurs in pumps, propellers, impellers, and in the vascular tissues of plants?

A. Vapor bubbles
B. Chamber pressure
C. Cavitation
D. Volumetric positive displacement
E. Reverse direction
F. None of the Above

139. The cavitation pits increase the turbulence of the fluid flow and create crevasses that act as nucleation sites for_____.

A. Cause water hammer
B. Cause residual stresses
C. Cause shock waves
D. Additional cavitation bubbles
E. Collapse of cavities
F. None of the Above

140. The pits also increase the component's surface area and leave behind residual stresses making the surface more prone to?

A. Cause water hammer
B. Cause residual stresses
C. Cause shock waves
D. Stress corrosion
E. Collapse of cavities
F. None of the Above

141. _____ is the process in which a bubble in a fluid is forced to oscillate in size or shape due to some form of energy input, such as an acoustic field.

A. Strainer
B. Diaphragm
C. Cavitation
D. Non-inertial cavitation
E. Time delay or ratchet assembly
F. None of the Above

142. According to the text, cavitation is, in many cases, an undesirable occurrence. In devices such as propellers and pumps, cavitation causes a great deal of _____, vibrations, and a loss of efficiency.

A. Cavitation
B. Turbulence
C. Driveshaft
D. Propellers and pumps
E. Noise, damage to components
F. None of the Above

143. Which of the following terms forces liquid energy into very small volumes, thereby creating spots of high temperature and emitting shock waves, the latter of which are a source of noise?

A. Suction side
B. Residual stresses
C. Shock waves
D. Cavitation bubbles collapse
E. Collapse of cavities
F. None of the Above

144. According to the text, although the collapse of a cavity is a relatively low-energy event, highly localized collapses can_____.

A. Cause water hammer
B. Cause residual stresses
C. Cause shock waves
D. Erode metals
E. Collapse of cavities
F. None of the Above

145. The pitting caused by the collapse of cavities produces great wear on components and can dramatically shorten a propeller's or pump's lifetime. After a surface is initially affected by cavitation, it tends to erode at an accelerating pace.

A. True B. False

Pump Glossary

146. Which of the following definitions is a barrier that separates stages of a multi-stage pump?

A. Gasket
B. Keyway
C. Bearing
D. Inter-stage diaphragm
E. Seal
F. None of the Above

147. _____ is a rectangular piece of metal that prevents the impeller from rotating on the shaft.

A. Gasket
B. Key
C. Energy
D. Bearing
E. Seal
F. None of the Above

148. Which of the following definitions is the area on the shaft that accepts the key?

A. Gasket
B. Keyway
C. Energy
D. Inter-stage diaphragm
E. Kinetic energy
F. None of the Above

149. _____ is any substance that can be pumped such as oil, water, refrigerant, or even air.

A. Fluid
B. Mixed flow pump
C. Energy
D. Substance
E. Flow
F. None of the Above

150. Which of the following definitions is a mechanical device that seals the pump stuffing box?

A. Packing
B. Bearing
C. Seal
D. Mechanical seal
E. Lantern ring
F. None of the Above

151. _____ is bushing at the bottom of the stuffing box that prevents packing from being pushed out of the stuffing box into the suction eye of the impeller.

A. Strainer
B. Suction
C. Suction eye
D. Stuffing box
E. Throat bushing
F. None of the Above

152. Which of the following definitions is force, usually along the centerline of the pump?

A. Thrust
B. Pressure
C. Suction
D. Vertical power
E. Energy
F. None of the Above

153. Which of the following definitions is a metal ring located between rings of packing that distributes gland sealing fluid?

A. Leak-off
B. Gland sealing line
C. Horizontal packing
D. Lantern ring
E. Gland follower
F. None of the Above

154. _____ is the fluid that leaks from the stuffing box.
A. Leak-off D. Lantern ring
B. Gland sealing leakage E. Gland follower
C. Horizontal leakage F. None of the Above

155. Which of the following definitions is a bushing used to compress the packing in the stuffing box and to control leakoff?
A. Leak-off packing D. Lantern ring
B. Gland sealing line E. Gland follower
C. Horizontal packing F. None of the Above

156. _____ are pumps in which the centerline of the shaft runs vertically.
A. Thrusters D. Vertical pumps
B. Vanes E. Double pumps
C. Suction pumps F. None of the Above

157. Which of the following definitions are replaceable tubular coverings on the shaft?
A. Protectors D. Shaft sleeve
B. Shrouds E. Stages
C. Covers F. None of the Above

158. _____ is the metal covering over the vanes of an impeller.
A. Slop drain D. Shaft sleeve
B. Shroud E. Stages
C. Slurry F. None of the Above

159. Which of the following definitions is the drain from the area that collects leak-off from the stuffing box?
A. Slop drain D. Shaft sleeve
B. Shroud E. Stages
C. Slurry drain F. None of the Above

160. _____is the part of the pump that changes the speed of the fluid into pressure.
A. Thrust D. Vertical pumps
B. Vanes E. Volute
C. Suction eye F. None of the Above

161. Which of the following definitions are the replaceable rings on the impeller or the casing that wear as the pump operates.
A. Seals D. Glands
B. Vanes E. Wearing rings
C. Packing glands F. None of the Above

162. _____ is a nut that keeps the parts in place.
A. Lock nut D. Radial bearings
B. Keyway E. Retaining nut
C. Cotter F. None of the Above

163. Which of the following definitions are the rotating parts, usually including the impeller, shaft, bearing housings, and all other parts included between the bearing housing and the impeller?
A. Inboard
B. Rotor
C. Mechanical
D. Flow parts
E. Retaining parts
F. None of the Above

164. Which of the following definitions is to cause lines, grooves, or scratches?
A. Wear
B. Burn
C. Score
D. Scratch
E. Grover
F. None of the Above

165. Which of the following definitions is a cylindrical bar that transmits power from the driver to the pump impeller?
A. Radial flow
B. Shaft
C. Transfer
D. Gear driver
E. Keyway
F. None of the Above

166. _____ is the place where fluid enters the pump.
A. Strainer
B. Suction
C. Entrance
D. Stuffing box
E. Throat
F. None of the Above

167. Which of the following definitions are bearings that prevent shaft movement in any direction outward from the centerline of the pump?
A. Volute
B. Rotor
C. Spider
D. Radial bearings
E. Retaining bearings
F. None of the Above

168. _____ is flow at 90° to the centerline of the shaft.
A. Radial flow
B. Reverse
C. Score
D. Vertical
E. Horizontal
F. None of the Above

169. Which of the following definitions is a device that retains solid pieces while letting liquids through?
A. Strainer
B. Lantern ring
C. Suction eye
D. Stuffing box
E. Throat bushing
F. None of the Above

170. _____ is the area of the pump where the shaft penetrates the casing.
A. Strainer
B. Leak-off
C. Suction eye
D. Stuffing box
E. Throat bushing
F. None of the Above

171. Which of the following definitions is the place where fluid enters the pump impeller?
A. Strainer
B. Suction
C. Suction eye
D. Stuffing box
E. Throat
F. None of the Above

172. _____ are pumps in which the centerline of the shaft is horizontal.
A. Dynamic
B. Centrifugal
C. Horizontal pumps
D. Turbine
E. Radical flow
F. None of the Above

173. Which of the following definitions are bearings that prevent shaft movement back and forth in the same direction as the centerline of the shaft?
A. Thrust
B. Spider
C. Suction
D. Vertical
E. Thrust bearings
F. None of the Above

174. _____ are parts of the impeller that push and increase the speed of the fluid in the pump.
A. Thrusters
B. Vanes
C. Drivers
D. Bowls
E. Volutes
F. None of the Above

175. Which of the following definitions is a thick, viscous fluid, usually containing small particles?
A. Slop
B. Mixed liquid
C. Slurry
D. Drawdown
E. Mud
F. None of the Above

176. _____ are Impellers in a multi-stage pump.
A. Volutes
B. Shrouds
C. Bowls
D. Shaft stages
E. Stages
F. None of the Above

177. Which of the following definitions are pumps with more than one impeller?
A. Turbine
B. Mixed flow
C. Inboard
D. Multi-stage pumps
E. Outboard
F. None of the Above

178. _____ is the end of the pump farthest from the motor.
A. Outlet
B. Impeller
C. Inboard
D. Exit
E. Outboard
F. None of the Above

179. Which of the following definitions is the soft, pliable material that seals the stuffing box?
A. Packing
B. Rubbers
C. Gaskets
D. Glands
E. Mechanical seal
F. None of the Above

180. _____ are pumps that move fluids by physically displacing the fluid inside the pump.
A. Bellows
B. Axial
C. Dynamic
D. Multi-stage pumps
E. Positive displacement pumps
F. None of the Above

Section 7 - Complicated Pumps
Complicated Pumps – Introduction

181. Pumps are excellent examples of_____.
A. Hydrostatics D. Multi-stage pumps
B. Quasi-static E. Complicated part
C. Oscillating diaphragm F. None of the Above

182. Pumps are of two general types, _____ or positive displacement pumps, and pumps depending on dynamic forces, such as centrifugal pumps.
A. Hydrostatic D. Hydrostatic considerations
B. Quasi-static E. Complicated part
C. Oscillating diaphragm F. None of the Above

183. Positive displacement pumps have a piston moving in a closely-fitting cylinder and forces are exerted on the fluid by motion of the piston.
A. True B. False

184. More complicated pumps have valves check valves that open to allow _____, and close automatically to prevent reverse flow.
A. Pistons D. Passage in one direction
B. Diaphragms E. Lift pumps
C. Discharged fluid F. None of the Above

185. There are many kinds of_____, and can be the most trouble-prone and complicated part of a pump.
A. Rotors D. Air space
B. Force pumps E. Valves
C. Inlets F. None of the Above

186. According to the text, the force pump has _____in the cylinder, one for supply and the other for delivery.
A. Two check valves D. Cylinders
B. Diaphragms E. Lift pumps
C. Rotors F. None of the Above

187. The supply valve opens when the cylinder_____, the delivery valve when the cylinder volume decreases.
A. Rotor D. Air space
B. Force pump E. Volume increases
C. Volume decreases F. None of the Above

188. According to the text, the lift pump has a _____and a valve in the piston that allows the liquid to pass around it when the volume of the cylinder is reduced.
A. Supply valve D. Cylinder
B. Diaphragm E. Lift pumps
C. Discharged fluid F. None of the Above

189. The delivery in this case is from the upper part of the_____, which the piston does not enter.
A. Rotor D. Air space
B. Force pump E. Cylinder
C. Volume decreases F. None of the Above

190. Diaphragm pumps are force pumps in which the oscillating diaphragm takes the place of the piston.
A. True B. False

191. The single valve is in one or both sides of the expandable_____.
A. Cylinder D. Cavity
B. Chamber E. Positive Displacement Pump(s)
C. Radial flow F. None of the Above

192. Which of the following terms uses the valve on the valve stem of the tire or inner tube to hold pressure in the tire?
A. Bellows pump D. Bicycle pump
B. Chamber pump E. Positive Displacement Pump
C. Radial flow pump F. None of the Above

193. _____ is attached to the discharge tube, has a flexible seal that seals when the cylinder is moved to compress the air, but allows air to pass when the movement is reversed?
A. Piston D. Cylinder
B. Diaphragm E. Sliding contact
C. Discharged fluid F. None of the Above

194. According to the text, diaphragm and vane pumps act the same way by varying the volume of a chamber, and directing the flow with_____.
A. Cylinder D. Cavity
B. Check valves E. Positive Displacement Pump(s)
C. Radial flow F. None of the Above

Centrifugal Pump Section
195. The centrifugal pump is an extremely simple machine. It is a member of a family known as rotary machines and consists of two basic parts: 1) the rotary element or impeller and 2) the stationary element or_____.
A. Staging D. Lantern ring spacer
B. Eye E. Casing (volute)
C. Pressure F. None of the Above

196. In operation, a centrifugal pump "_____" liquid out of the impeller via centrifugal force.
A. Web of the ring D. Vapor bound
B. Slings E. Single-stage pump
C. Pump shaft F. None of the Above

197. A pump does not create pressure; it only provides flow. Pressure is just an indication of the amount of_____.
A. Staging D. Resistance to flow
B. Eye E. Recirculation lines
C. Pressure F. None of the Above

198. Centrifugal pumps are classified as HORIZONTAL or VERTICAL, depending upon the position of the pump shaft.
A. True B. False

199. Centrifugal pumps may also be classified as either SINGLE STAGE or MULTI-STAGE.
A. True B. False

200. A multi-stage pump has one impellers housed together in two casings.
A. True B. False

201. Which of the following terms has only one impeller?
A. Axial D. Multi-stage
B. Closed pumps E. Single-stage pump
C. Double suction F. None of the Above

202. The impellers used on centrifugal pumps may be classified as_____.
A. By the volute D. Single or double suction
B. Open or Closed E. Single-stage pump
C. The type of driver F. None of the Above

203. The single-suction impeller allows liquid to enter the eye from one side only. The double-suction impeller allows liquid to enter the_____ from two directions.
A. Staging D. Volute
B. Eye E. Recirculation line
C. Pressure F. None of the Above

204. Which of the following terms are also classified as Closed or Open?
A. Webs D. Impellers
B. Volutes E. Single-stage pumps
C. Dynamic pumps F. None of the Above

205. Which of the following terms have sidewalls that extend from the eye to the outer edge of the vane tips?
A. Staging D. Closed impellers
B. Eyes E. Recirculation lines
C. Pressure vanes F. None of the Above

206. Some small pumps with single-suction impellers have only a casing wearing ring and no _____.
A. Staging D. Lantern ring spacer
B. Eye E. Recirculation lines
C. Impeller ring F. None of the Above

207. Which of the following terms are installed on some centrifugal pumps to prevent the pumps from overheating and becoming vapor bound?
A. Air relief D. Recirculation lines
B. Foot valve E. Single-stage pump
C. Pump shaft F. None of the Above

208. _____ is installed to cool the shaft and the packing, to lubricate the packing, and to seal the rotating joint between the shaft and the packing against air leakage.
A. Staging D. Lantern ring spacer
B. Eye E. Water jet
C. Seal piping F. None of the Above

209. Which of the following terms is inserted between the rings of the packing in the stuffing box?
A. Web of the ring D. Mechanical seal
B. Lantern ring spacer E. Bearings
C. Pump shaft F. None of the Above

210. According to the text, seal piping leads the liquid from the discharge side of the pump to the annular space formed by the?
A. Staging D. Lantern ring spacer
B. Eye E. Volute
C. Lantern ring F. None of the Above

211. According to the text, the web of the ring is perforated so that the water can flow in either direction along the shaft between the_____.
A. Web of the ring D. Mechanical seal
B. Shaft and the packing E. Packing ring
C. Pump shaft F. None of the Above

212. Which of the following terms are fitted on the shaft between the packing gland and the pump bearing housing?
A. Staging D. Lantern ring spacer
B. Water flinger rings E. Packing gland
C. Seals F. None of the Above

213. These flingers prevent water in the _____from flowing along the shaft and entering the bearing housing.
A. Web of the ring D. Stage
B. Stuffing box E. Volute
C. Pump shaft F. None of the Above

Let's look at the components of the centrifugal pump.
214. As the impeller rotates, it sucks the liquid into the center of the pump and throws it out under pressure through the?
A. Web of the ring D. Vapor bound
B. Outlet E. Single-stage pump
C. Pump shaft F. None of the Above

215. The casing that houses the impeller is referred to as the_____, the impeller fits on the shaft inside.

A. Staging
B. Eye
C. Volute
D. Lantern ring spacer
E. Recirculation lines
F. None of the Above

Pump Casing

216. The most common type of centrifugal pump is an end suction pump.

A. True B. False

217. Another type of centrifugal pump used is the split case.

A. True B. False

218. The line shaft turbine is really a single stage centrifugal pump.

A. True B. False

219. There are many variations of split case, such as; two-stage, single suction, and _____.

A. Radial flow impellers
B. Double suction
C. Parallel
D. Mixed media
E. Multi media
F. None of the Above

Impeller

220. In most centrifugal pumps, the impeller looks like a number of cupped vanes on blades mounted on _____.

A. Radial flow impellers
B. Axial flow impellers
C. Parallel to the shaft
D. Cupped vanes on blades
E. Disc or shaft
F. None of the Above

221. As the water is being thrown out of the pump, this means you can run centrifugal pumps with the discharged valve closed for long periods.

A. True B. False

222. The impellers all cause a flow from the eye of the impeller to the outside of the impeller.

A. True B. False

223. According to the text, some impellers cause what is called_____, and they can be referred to as radial flow impellers.

A. Radial flow impellers
B. Axial flow impellers
C. Parallel to the shaft
D. Radial flow
E. Shape of the vanes
F. None of the Above

224. _____of the impeller and how it is installed in the casing will determine if it is high volume / low pressure or the type of liquid that could be pumped.

A. Shape of the vanes
B. Line shaft turbine
C. Parallel to the shaft
D. Critical distance
E. Discharge piping outlet
F. None of the Above

225. _____ looks like a propeller and create a flow that is parallel to the shaft.
A. Radial flow impellers
B. Axial flow impellers
C. Parallel to the shaft
D. Cupped vanes on blades
E. Shape of the vanes
F. None of the Above

226. The roto-dynamic pump produces a head and a flow by increasing the velocity of the liquid through the machine with the help of a rotating vane impeller.
A. True B. False

Screw or Auger Pump
227. The machine consists of a screw inside a hollow pipe. Some attribute its invention to Archimedes while others attribute it to Nebuchadnezzar II, the screw can be thought of as?
A. Casing
B. Screw
C. Stair case
D. An inclined plane
E. Spiral tube
F. None of the Above

228. _____ is turned as the bottom end of the tube turns; it scoops up a volume of water.
A. Casing
B. Screw
C. Suction side
D. Equilibrium
E. Spiral tube
F. None of the Above

229. According to the text, an amount of water will slide up in the spiral tube as the _____is turned, until it finally pours out from the top of the tube and feeds the irrigation system.
A. Casing
B. Screw
C. Suction side
D. Shaft
E. Spiral tube
F. None of the Above

230. The contact surface between the screw and the pipe does not need to be perfectly water-tight because of the relatively large amount of water being scooped at each turn with respect to the?
A. Casing
B. Screw
C. Suction side
D. Equilibrium
E. Angular speed of the screw
F. None of the Above

231. Water leaking from the top section of the _____ will leak into the previous one and so on.
A. Casing
B. Screw
C. Suction side
D. Equilibrium
E. Spiral tube
F. None of the Above

232. Which of the following terms is related to how does it turn inside the casing, but can be allowed to turn with it in one piece?
A. Casing
B. Screw
C. Suction side
D. Equilibrium
E. Spiral tube
F. None of the Above

233. A large screw provides the mechanical action to move the liquid from the suction side to the?
A. Casing D. Discharge side of the pump
B. Screw E. Spiral tube
C. Suction side F. None of the Above

234. Which of the following terms can rotate in the 30 to 60 rpm range, although some pumps are faster?
A. Casing D. Equilibrium
B. Screw pumps E. Spiral tube
C. Suction side F. None of the Above

235. The slope of the _____ is normally either 30° or 38°.
A. Casing D. Equilibrium
B. Screw E. Spiral tube
C. Suction side F. None of the Above

236. The maximum lift for the larger diameter pumps is about 300 feet.
A. True B. False

Progressing Cavity Pump Section
237. The progressive cavity pump can be run dry, because there is no friction between the rotor and stator will quickly damage the pump.
A. True B. False

238. According to the text, as the rotor turns within the stator, cavities are formed which progress from the suction to the _____, conveying the pumped material.
A. Cavitation D. Discharge end of the pump
B. Turbulence E. Center of rotation
C. Driveshaft F. None of the Above

239. _____ between the rotor and the stator helices keeps the fluid moving steadily at a fixed flow rate proportional to the pump's rotational speed.
A. Suction side D. Pump casing
B. Residual stresses E. Continuous seal
C. Shock waves F. None of the Above

240. Which of the following terms are used to pump material very high in solids content?
A. Suction side D. Pump casing
B. Residual stresses E. Collapse of cavities
C. Progressing cavity pumps F. None of the Above

More on the Progressive Cavity Pump
241. A progressive cavity pump is also known as a progressing cavity pump, eccentric screw pump, or even just_____.
A. Drag, or friction pump D. High pressure pump
B. Helical shaft pump E. Eccentric screw pump
C. Cavity pump F. None of the Above

242. This type of pump transfers fluid by means of the progress, through the pump, of a sequence of small, fixed shape, discrete cavities, as its?
A. Flow rate D. Rotor is turned
B. Hypocycloids E. Peristaltic pump(s)
C. Piston pump F. None of the Above

243. _____ being proportional to the rotation rate and to low levels of shearing being applied to the pumped fluid.
A. Drag, or friction D. High pressure
B. Volumetric flow rate E. Eccentric screw pump
C. Cavities F. None of the Above

244. progressive cavity pumps have application in fluid metering and pumping of viscous or shear sensitive materials.
A. True B. False

245. With the progressive cavity pump, there no flow pulsing is caused by the arrival of_____, other than that caused by compression of the fluid or pump components.
A. Flow rate D. Pump size
B. Hypocycloids E. Cavities at the outlet
C. Piston pump F. None of the Above

246. With the progressive cavity pump, the principle of this _____is due to a dynamic effect caused by drag, or friction against the moving teeth of the screw rotor.
A. Drag, or friction D. High pressure
B. Helical shaft E. Pumping technique
C. Cavities F. None of the Above

247. In reality it is due to sealed cavities, being able to pump at extremely low rates, even to high pressure, revealing the effect to be purely?
A. Flow rate D. Pump size
B. Hypocycloids E. Positive displacement
C. Piston pump F. None of the Above

248. The mechanical layout that causes the cavities to, uniquely, be of fixed dimensions as they move through the pump, the shape of the gap formed between a helical shaft and a two start, twice the wavelength and double the diameter, helical hole, as the shaft is "_____" around the inside surface of the hole.
A. Dragged D. Turned
B. Helical rolled E. Eccentrically screwed
C. Rolled F. None of the Above

249. The motion of the rotor being the same as the smaller gears of a planetary gears system. This form of motion gives rise to the curves called?
A. Flow rate D. Pump curves
B. Hypocycloids E. Peristaltic curves
C. Piston pump F. None of the Above

250. With the progressive cavity pump, in order to produce a seal between cavities, the rotor so takes a form similar to a corkscrew, and this, combined with the off-center rotary motion
A. True B. False

251. Which of the following terms and various rotor/stator pitch ratios exist, but are specialized in that they don't generally allow complete sealing?
A. Flow rate D. Pump size
B. Speeds E. Different rotor shapes
C. Drivers F. None of the Above

252. According to the text, pumps are often fitted with cut-off pressure switches, burst disks or a bypass pipe that allows a variable amount of a fluid to return to the inlet.
A. True B. False

253. Which of the following terms is there a fixed flow rate pump is effectively converted to a fixed pressure one?
A. Drag, or friction D. Double pump
B. Centrifugal E. Dynamic pump
C. Bypass fitted F. None of the Above

254. _____ refers to where the rotor touches the stator, the surfaces are generally traveling transversely, so small areas of sliding contact occur, these areas need to be lubricated by the fluid being pumped.
A. Torque D. Hydrodynamic lubrication
B. Lubrication layer E. Liquid's resistance to flow
C. Elastomer core F. None of the Above

255. _____ offer long life and reliable service transporting thick or lumpy fluids, abrasive fluids will significantly shorten the life of the stator.
A. Elastomer D. Elastomer compatibility
B. Rotor E. Progressive cavity pumps
C. Axial F. None of the Above

Submersible Pump Section
256. Submersible pumps are in essence very similar to_____.
A. Cased wells D. Pump bowl assembly
B. Turbine pumps E. VHS or VSS motors
C. Pump’s intake F. None of the Above

257. The pump shaft has a keyway in which the splined motor end shaft inserts, the motor is often bolted to the_____.
A. Motor D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

258. The pump's intake is located between the motor and the pump and is normally screened to prevent sediment from entering the pump and damaging the?
A. Impellers D. Pump bowl assembly
B. Shroud E. VHS or VSS motors
C. Pump's intake F. None of the Above

259. These types of pumps are often installed such that flow through the _____can occur upwards past the motor and into the intake.
A. Well screen D. Pump housing
B. Pump shrouds E. Number of stages
C. Volute F. None of the Above

260. Which of the following terms if inserted below the screened interval or below all productive portions of the aquifer, it will not be cooled, resulting in premature motor failure?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Motor end
C. Pump's intake F. None of the Above

261. Some pumps may have _____ installed on them to force all the water to move past the motor to prevent overheating.
A. Motor D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

262. Which of the following terms is a piece of pipe that attaches to the pump housing with an open end below the motor?
A. Cased wells D. Pump bowl assembly
B. Shroud E. VHS or VSS motors
C. Pump's intake F. None of the Above

263. With the turbine pump, the size of the bowls and impellers, number of stages, and horsepower of the motor are adjusted to achieve the desired production rate within the limitations of the?
A. Motor D. Pump housing
B. Pump shrouds E. Pumping head
C. Canned configurations F. None of the Above

Understanding the Operation of a Vertical Turbine Pump
264. Turbine pump efficiencies are comparable to or greater than most centrifugal pumps, these are usually more expensive than centrifugal pumps and more difficult to inspect and repair.
A. True B. False

265. According to the text, the intake for the turbine pump is continuously under water, priming is not a concern.
A. True B. False

266. Which of the following terms are available in deep well, shallow well, or canned configurations?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Vertical turbine pumps
C. Pump's intake F. None of the Above

267. Which of the following terms are also available, these pumps are also suitable industrial, municipal, commercial and agricultural applications?
A. Motor D. Submersible motors
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

268. Deep well turbine pumps are adapted for use in cased wells or where the water surface is below the practical limits of a?
A. Cased wells D. Pump bowl assembly
B. Shroud E. Centrifugal pump
C. Pump's intake F. None of the Above

269. _____ are also used in surface water systems?
A. Turbine pumps D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

270. According to the text, the turbine pump has three main parts: (1) the_____, (2) the shaft and column assembly and (3) the pump bowl assembly.
A. Head assembly D. Pump bowl assembly
B. Shroud E. VHS or VSS motors
C. Pump's intake F. None of the Above

271. The head is normally cast iron and designed to be installed on a foundation. It supports the column, shaft, and bowl assemblies, and provides a discharge for the water.
A. True B. False

272. The head will support either an electric motor, a _____or a belt drive.
A. Right angle gear drive D. Pump housing
B. Pump shrouds E. Number of stages
C. Canned configurations F. None of the Above

Bowl Assembly
273. The clutch assembly is the heart of the vertical turbine pump.
A. True B. False

274. The impeller and diffuser type casing is designed to deliver the energy that the system requires as efficiently as possible.
A. True B. False

275. Maximum flexibility both in the initial pump selection and in the event that future system modifications require a change in the pump rating, therefore Vertical turbine pumps can be?
A. Clutch driven
B. Driver mounted
C. Solid shaft drivers
D. Progressive
E. Multi-staged
F. None of the Above

276. The submerged impellers allow the pump to be started with a foot valve.
A. True B. False

277. _____ changes the direction of flow from vertical to horizontal, and couples the pump to the system piping, in addition to supporting and aligning the driver.
A. Clutch assembly
B. Driver mounting base
C. Solid shaft drivers
D. Discharge head
E. Priming Capacity
F. None of the Above

Drivers
278. Which of the following terms is where the pump shaft extends through a tube in the center of the rotor and is connected to the driver by a clutch assembly at the top of the driver?
A. Clutch assembly
B. Driver mounting base
C. Solid shaft drivers
D. Aligning the driver
E. Hollow shaft drivers
F. None of the Above

279. With the solid shaft driver, the _____is solid and projects below the driver mounting base.
A. Clutch assembly
B. Rotor shaft
C. Solid shaft drivers
D. Aligning the driver
E. Priming Capacity
F. None of the Above

Discharge Head Assembly
280. The discharge head supports the driver and bowl assembly as well as supplying a discharge connection also called?
A. NUF
B. Head and pump bowls
C. Discharge head
D. An open shaft
E. Several bowls are stacked in series
F. None of the Above

281. According to the text, a shaft sealing arrangement is located in the discharge head to seal the shaft where it leaves the?
A. Single-stage pump
B. Line shaft
C. Liquid chamber
D. Semi-open or enclosed
E. Mechanical seal assembly
F. None of the Above

282. The shaft seal is usually a lantern ring type device.
A. True B. False

Column Assembly
283. Due to its limited diameter, each impeller develops a relatively low head.
A. True B. False

284. In most deep well turbine installations, several bowls are stacked in series one above the other, this is called staging.
A. True B. False

285. The oil-lubricated pump has an enclosed shaft into which oil drips, lubricating the bearings.
A. True B. False

286. The shaft and _____provides a connection between the head and pump bowls.
A. Column assembly D. An open shaft
B. Head and pump bowls E. Several bowls are stacked in series
C. Discharge head F. None of the Above

287. The line shaft transfers the power from the motor to the impellers and the column carries the water to the surface.
A. True B. False

288. Which of the following terms on a turbine pump may be either water lubricated or oil lubricated?
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Mechanical seal assembly
C. Oil drips F. None of the Above

289. According to the text, the water-lubricated pump has?
A. 10-foot centers D. An open shaft
B. Head and pump bowls E. Bowls are stacked in series
C. Discharge head F. None of the Above

290. According to the text, if there is a possibility of fine sand being pumped, select the oil lubricated pump because it will keep the _____of the bearings.
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Mechanical seal assembly
C. Sand out F. None of the Above

291. Line shaft bearings are commonly placed on _____ for water-lubricated pumps operating at speeds under 2,200 RPM and at 5-foot centers for pumps operating at higher speeds.
A. 10-foot centers D. An open shaft
B. Head and pump bowls E. Several bowls are stacked in series
C. Discharge head F. None of the Above

292. According to the text, oil-lubricated bearings are commonly placed on_____.
A. 10-foot centers D. An open shaft
B. Head and pump bowls E. 5-foot centers
C. Discharge head F. None of the Above

293. _____ encloses the impeller.
A. Pump bowl D. An open shaft
B. Head and pump bowls E. Several bowls are stacked in series
C. Discharge head F. None of the Above

294. Which of the following terms contains four impellers; all attached to a common shaft and will operate at four times the discharge head of a single-stage pump?
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Four-stage bowl assembly
C. Fine sand F. None of the Above

295. _____ used in turbine pumps may be either semi-open or enclosed.
A. Single-stage pump D. Semi-open or enclosed
B. Line shaft E. Mechanical seal assembly
C. Impellers F. None of the Above

296. The vanes on semi-open impellers are open on the bottom and they rotate with a close tolerance to the bottom of the?
A. Pump bowl D. Lineshaft bearings
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

297. During the initial break-in period the line shaft couplings will tighten, therefore, after about 1000 hours of operation, the impeller adjustments should be checked.
A. True B. False

298. According to the text, the column assembly is of two basic types, either of which may be used: Open _____construction utilizes the fluid being pumped to lubricate the lineshaft bearings.
A. Pumping level D. Upward adjustment
B. Lineshaft E. Utilizes the fluid
C. Discharge head F. None of the Above

299. Which of the following terms has an enclosing tube around the lineshaft and utilizes oil, grease, or injected liquid to lubricate the lineshaft bearings?
A. Bowl shaft D. Lineshaft
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

Column assembly will consist of:
300. According to the text, column pipe, which connects the _____to the discharge head,
A. Pumping level D. Upward adjustment
B. Bowl assembly E. Utilizes the fluid
C. Discharge head F. None of the Above

301. Shaft, connecting the bowl shaft to the_____.
A. Bowl shaft D. Lineshaft bearings
B. Driver E. Discharge head
C. Suction bell F. None of the Above

302. Column pipe can be either threaded or flanged.
A. True B. False

303. Some units will not require_____, having the bowl assembly connected directly to the discharge head instead.
A. Bowl shaft D. Column assembly
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

Bowl Assemblies
The bowl consists of:
304. Impellers rigidly mounted on the _____, which rotate and impart energy to the fluid,
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

305. Which of the following terms to contain the increased pressure and direct the fluid?
A. Bowl shaft D. Lineshaft bearings
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

306._____or case which directs the fluid into the first impeller.
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

307. Bearings located in the suction bell (or case) and in each_____.
A. Bowl shaft D. Lineshaft bearings
B. Bowl E. Discharge head
C. Suction bell F. None of the Above

308. _____ may cause inefficient pump operation if they are not properly adjusted.
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Impellers
C. Column pipe F. None of the Above

309. Mechanical damage will result if the semi-open impellers are set too low and the vanes rub against the bottom of the_____.
A. Bowl shaft D. Lineshaft bearings
B. Bowls E. Discharge head
C. Suction bell F. None of the Above

310. These items must still be checked and adjusted, the adjustment of _____ is not as critical.
A. Line shaft D. Enclosed impellers
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

311. Impeller adjustments are made by tightening or loosening a nut on the top of the _____.
A. Line shaft D. Head assembly
B. Bowl shaft E. Suction bell
C. Column pipe F. None of the Above

312. _____ are normally made by lowering the impellers to the bottom of the bowls and adjusting them upward?
A. Bowl shaft D. Lineshaft bearings
B. Bowls E. Impeller adjustments
C. Suction bell F. None of the Above

313. The amount of _____is determined by how much the line shaft will stretch during pumping.
A. Pumping level D. Upward adjustment
B. Tolerance E. Leakage
C. Discharge head F. None of the Above

314. According to the text, the adjustment must be made based on the lowest possible pumping level in the well, the proper adjustment procedure if often provided by the?
A. Pumping level D. Upward adjustment
B. Tolerance E. Pump manufacturer
C. Discharge head F. None of the Above

Stuffing Box Adjustment
315. On the initial starting it is very important that the packing gland not be tightened too much.
A. True B. False

316. To prevent damage to the shaft and shortening of the packing life, new packing must be "_____" properly
A. Packing gland D. Lineshaft bearings
B. Run in E. Variances
C. Impending trouble F. None of the Above

317. The stuffing box must be allowed to leak for_____.
A. Periodic inspection D. Any deviation in performance
B. Proper operation E. Air to be released
C. Correct alignment F. None of the Above

318. Bring both nuts down evenly and in small steps until the leakage is reduced as required, when adjusting the?
A. Packing gland D. Lineshaft bearings
B. Oil reservoir E. Lantern
C. Impending trouble F. None of the Above

319. The nuts should only be tightened about ½ turn at a time at 20 to 30 minute intervals to allow the packing to_____.
A. Run in D. Any deviation in performance
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

320. A new set of ring packing will need to be added to keep the?
A. Packing gland D. Lineshaft bearings
B. Box full E. Variances
C. Impending trouble F. None of the Above

321. According to the text, after adding two or three rings of packing, or when proper adjustment cannot be achieved, the _____should be cleaned completely of all old packing and re-packed.
A. Periodic inspection D. Any deviation in performance
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

Lineshaft Lubrication
322. Which of the following terms are lubricated by the pumped fluid and on close-coupled units, will usually not require pre or post lubrication?
A. Packing gland D. Open lineshaft bearings
B. Oil reservoir E. Enclosed lineshaft bearings
C. Driver F. None of the Above

323. _____ are lubricated by extraneous liquid, which is fed to the tension nut by either a gravity flow system or pressure injection system.
A. Packing gland D. Open lineshaft bearings
B. Oil reservoir E. Enclosed lineshaft bearings
C. Impending trouble F. None of the Above

324. According to the text, the oil reservoir must be kept filled with a good quality _____and adjusted to feed 10 to 12 drops per minute plus one (1) drop per 100’ of setting.
A. Packing gland D. Lineshaft bearings
B. Oil reservoir E. Light turbine oil
C. Impending trouble F. None of the Above

325. Injection systems are designed for each installation — injection pressure and quantity of lubricating liquid will vary.
A. True B. False

General Maintenance Section

326. A foundation of concrete provides a permanent and trouble-free installation; it must be large enough to allow the head assembly to be securely fastened.
A. True B. False

327. _____ is recommended as the best means of preventing breakdown and keeping maintenance costs to a minimum.
A. Periodic destruction D. Checking deviation in performance
B. PM of the stuffing box E. Periodic inspection
C. Correct alignment F. None of the Above

328. Maintenance personnel should look over the whole installation with a critical eye each time the pump is inspected — a change in noise level, amplitude or vibration, or performance can be?
A. Packing gland D. Lineshaft bearings
B. Oil reservoir E. Variances
C. Impending trouble F. None of the Above

329. Which of the following terms or operation from what is expected can be traced to some specific cause?
A. Periodic inspection D. Any deviation in performance
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

330. Which of the following terms or improper operation is essential to the correction of the trouble — whether the correction is done by the user, the dealer or reported back to the factory?
A. Packing gland D. Lineshaft bearings
B. Oil reservoir E. Variances
C. Impending trouble F. None of the Above

331. Which of the following terms from initial performance will indicate changing system conditions or wear or impending breakdown of unit?
A. Packing gland D. Lineshaft bearings
B. Oil reservoir E. Variances
C. Impending trouble F. None of the Above

332. According to the text, deep well turbine pumps must have _____ between the pump and the power unit.
A. Periodic inspection D. Any deviation in performance
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

333. _____ is made easy by using a head assembly that matches the motor and column/pump assembly.
A. Packing gland D. Correct alignment
B. Oil reservoir E. Variances
C. Impending trouble F. None of the Above

334. Which of the following terms must be vertically aligned so that no part touches the well casing?
A. Periodic inspection D. Pump column assembly
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

335. Spacers are usually attached to the pump column to prevent the pump assembly from touching the well casing.
A. True B. False

336. Which of the following terms out of vertical alignment may also cause excessive bearing wear?
A. Periodic inspection D. Pump column
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

337. Which of the following terms must be mounted on a good foundation at least 12 inches above the ground surface?
A. Packing gland D. Lineshaft bearings
B. Oil reservoir E. Head assembly
C. Impending trouble F. None of the Above

338. The foundation should have at least 12 inches of bearing surface on all sides of the well. In the case of a gravel-packed well, the 12-inch clearance is measured from the outside edge of the?
A. Periodic inspection D. Gravel packing
B. Stuffing box E. Gravity flow system
C. Correct alignment F. None of the Above

Section 8- Pump Operation and Performance Key Terms
339. Which of the following key terms is a number which represents the function of pump flow, head, efficiency?
A. NPSH D. S.G.: Specific gravity
B. Specific Speed E. Vapor Pressure
C. Viscosity F. None of the Above

340. _____ determines the type of pump used, the speed it can run at, and with gear pumps, the internal clearances required.
A. NPSH D. S.G.: Specific gravity
B. Specific Speed E. Vapor Pressure
C. Viscosity F. None of the Above

341. Which of the following key terms is the amount of pressure / head required to 'force' liquid through pipe and fittings?
A. NPSH D. Friction Loss
B. Specific Speed E. Vapor Pressure
C. Viscosity F. None of the Above

342. Which of the following key terms is related to how much suction lift a pump can achieve by creating a partial vacuum?
A. NPSH D. S.G.: Specific gravity
B. Specific Speed E. Vapor Pressure
C. Viscosity F. None of the Above

343. _____ is related to how a liquid is greater than the surrounding air pressure, the liquid will boil.
A. NPSH D. S.G.: Specific gravity
B. Specific Speed E. Vapor Pressure
C. Viscosity F. None of the Above

NPSH - Net Positive Suction Head Section
344. NPSH (a) must exceed NPSH(r) to allow pump operation without cavitation.
A. True B. False

345. The vapor pressure of water at 95 degrees C is 84.53 kPa, there was enough suction to contain the vapor, but once the atmospheric pressure dropped at the higher elevation, the vapor was able to escape.
A. True B. False

346. NPSH(r) is the Net Positive Suction Head Required by the pump, which is read from the?
A. Pump suction D. Pump performance curve
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

Affinity Laws
347. The centrifugal pump is a very capable and_____.
A. Commonly found D. Atmospheric pressure
B. Transmit tension E. Flexible machine
C. Most economical F. None of the Above

348. The performance of a centrifugal pump can be varied by changing the _____ or its rotational speed.
A. Pump suction D. Rotational speed
B. Speed E. Impeller diameter
C. Suction conditions F. None of the Above

349. Reducing impeller diameter is probably the most common change and is usually the?
A. Most economical D. Atmospheric pressure
B. Transmit tension E. Laws of Affinity
C. Most economical F. None of the Above

350. The speed can be altered by changing _____or by changing the speed of the driver.
A. Pump suction D. Rotational speed
B. Pulley diameters E. Hydraulic efficiency
C. Suction conditions F. None of the Above

351. _____ or change in impeller diameter, the Laws of Affinity give results that are approximate.
A. Centrifugal Pump D. Speed change
B. Transmit tension E. Laws of Affinity
C. Most economical F. None of the Above

352. According to the text, the discrepancy between the _____and the actual values obtained in test are due to hydraulic efficiency changes that result from the modification.
A. Calculated values D. Rotational speed
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

353. _____ give reasonably close results when the changes are not more than 50% of the original speed or 15% of the original diameter.
A. Centrifugal Pump D. Atmospheric pressure
B. Transmit tension E. Laws of Affinity
C. Most economical F. None of the Above

354. Which of the following terms are some of the most important factors affecting centrifugal pump operation?
A. Pump suction D. Rotational speed
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

Suction Lift
355. According to the text, atmospheric pressure at sea level is called “absolute pressure” because it is a measurement using absolute zero as a base.
A. True B. False

356. A pump cannot push or "force" a liquid up its suction pipe because liquids do not exhibit tensile strength.
A. True B. False

357. The vapor pressure of a liquid is the pressure necessary to keep the liquid from vaporizing at a given temperature.
A. True B. False

358. When a pump creates a suction, it is simply reducing local pressure by creating a partial vacuum.
A. True B. False

359. Atmospheric or some other external pressure acting on the surface of the liquid pushes the liquid up the suction pipe into the pump.
A. True B. False

360. According to the text, no pump can attain a suction lift of 34 ft; however, well-designed ones can reach 25 ft quite easily.
A. True B. False

361. In addition to pump design and_____, there are two physical properties of the liquid being pumped that affect suction lift.
A. Pump suction D. Suction piping
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

362. Maximum suction lift is dependent upon the pressure applied to the surface of the liquid at the suction source. _____decreases as pressure decreases.
A. Centrifugal Pump D. Atmospheric pressure
B. Transmit tension E. Laws of Affinity
C. Maximum suction lift F. None of the Above

363. Which of the following terms is dependent upon the vapor pressure of the liquid being pumped?
A. Pump suction D. Maximum suction lift
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

364. Vapor pressure increases as liquid temperature increases. _____decreases as vapor pressure rises.
A. Vapor pressure D. Rotational speed
B. Speed E. Maximum suction lift
C. Suction conditions F. None of the Above

365. Maximum suction lift will increase as the external pressure on its source increases.
A. True B. False

Cavitation - Two Main Causes:
366. Due to low pressure the _____and higher pressure implodes into the vapor bubbles as they pass through the pump, causing reduced performance and potentially major damage.
A. Pump suction D. Water vaporizes (boils)
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

367. Suction or discharge recirculation. The pump is designed for a certain flow range, if there is not enough or too much flow going through the pump, the resulting _____can reduce performance and damage the pump.
A. Pump suction D. Turbulence and vortexes
B. Speed E. Hydraulic efficiency
C. Suction conditions F. None of the Above

Affinity Laws
368. The flow changes proportionally to speed.
A. i.e.: double the speed / multiply the pressure by 4
B. i.e.: double the speed / double the flow
C. i.e.: double the speed / multiply the power by 8
D. None of the Above

369. The pressure changes by the square of the difference.
A. i.e.: double the speed / multiply the pressure by 4
B. i.e.: double the speed / double the flow
C. i.e.: double the speed / multiply the power by 8
D. None of the Above

370. The power changes by the cube of the difference.
A. i.e.: double the speed / multiply the pressure by 4
B. i.e.: double the speed / double the flow
C. i.e.: double the speed / multiply the power by 8
D. None of the Above

Motor and Pump Calculations Defined

371. Which of the following terms is the height we are pumping to, or the height to the discharge piping outlet that is filling the tank from the top?
A. Static head
B. Pump discharge head
C. Friction Loss
D. System or dynamic head
E. Negative suction head
F. None of the Above

372. Which of the following terms, pumping to a pressurized vessel we must convert the pressure units to head units?
A. Positive suction head
B. Pressure head
C. Friction Loss
D. Negative suction head
E. Total Dynamic Head (TDH)
F. None of the Above

373. _____ is caused by friction in the pipes, fittings, and system components.
A. Static head
B. Pump discharge head
C. Friction Loss
D. System or dynamic head
E. Negative suction head
F. None of the Above

Suction Head is Measured the Same Way.

374. If the liquid level is above the pump centerline, that level is a positive suction head.
A. True B. False

375. If the pump is lifting a liquid level from below its centerline, it is a?
A. Positive suction head
B. Friction
C. Friction Loss
D. Negative suction head
E. Total Dynamic Head (TDH)
F. None of the Above

376. If the pump is pumping liquid from a pressurized vessel, you must convert this pressure to a positive suction head.
A. True B. False

377. A vacuum in the tank would be converted to a?
A. Static head
B. Pump discharge head
C. Friction Loss
D. System or dynamic head
E. Negative suction head
F. None of the Above

378. Friction loss is calculated via a formula or a chart, taking into account the pipe diameter and roughness and the fluid flow rate, density, and viscosity.
A. True B. False

379. According to the text, friction in the pipes, fittings, and associated hardware is a?
A. Positive suction head D. Negative suction head
B. Friction E. Total Dynamic Head (TDH)
C. Friction Loss F. None of the Above

Electrical Motor Section - Introduction
380. The purpose of the bearing house is to hold the shaft firmly in place, yet allow it to rotate.
A. True B. False

381. The pump assembly can only be a vertical set-up.
A. True B. False

382. The power source of the pump is usually an electric motor. The motor is connected by a coupling to the?
A. Static head D. System or dynamic head
B. Bearings E. Pump shaft
C. Pump assembly F. None of the Above

383. Which of the following terms supports the bearings and provides a reservoir for the lubricant?
A. Static head D. System or dynamic head
B. Bearings E. Bearing house
C. Pump assembly F. None of the Above

384. An impeller is connected to the_____.
A. Static head D. System or dynamic head
B. Bearings E. Shaft
C. Pump assembly F. None of the Above

Section 12 – SCADA Introduction
385. Industrial organizations and companies in the public and private sectors to maintain and control efficiency, distribute data for smarter decisions, and communicate system issues to help mitigate downtime utilize SCADA systems.
A. True B. False

386. SCADA systems are critical for industrial organizations (like water and wastewater facilities) since they help to maintain efficiency, process data for smarter decisions, and communicate system issues to help mitigate downtime.
A. True B. False

387. The SCADA software will process, distribute, and display important data, helping operators and other employees understand the data and make important decisions.
A. True B. False

388. The acronym SCADA refers to the centralized computer systems that control and monitor the entire sites, or they are the complex systems spread out over large areas. Nearly all the control actions are automatically performed by the remote terminal units (RTUs) or by the programmable logic controllers (PLCs).
A. True B. False

389. Data acquisition starts at the HMI level, which includes the equipment status reports, and meter readings. Data is then formatted in such way that the operator of the control room can make the supervisory decisions to override or adjust normal HMI controls, by using the PLC.
A. True B. False

390. SCADA systems implement the distributed databases known as Excel databases, containing data elements called rows or columns.
A. True B. False

391. The key attribute of a SCADA system is its capability to perform a supervisory operation over a variety of other proprietary devices.
A. True B. False

392. The internet is linked to the SCADA system's databases, to provide the diagnostic data, management information and trending information such as logistic information, detailed schematics for a certain machine or sensor, maintenance procedures and troubleshooting guides.
A. True B. False

393. The HMI, or Human Machine Interface, is a device apparatus that gives the processed data to the human operator. A human operator uses HMI to control processes.
A. True B. False

394. The information provided by the HMI to the operating personnel is graphical, in the form of mimic diagrams. This means the schematic representation of the plant that is being controlled is obtainable to the operator.
A. True B. False

395. Which of the following terms can convert electrical signals coming from the equipment into digital values like the status- open/closed – from a valve or switch, or the measurements like flow, pressure, current or voltage?
A. RTU C. PLC
B. HMI D. None of the Above

396. By converting and sending the electrical signals to the equipment, _____ may control the equipment, like closing or opening a valve or a switch, or setting the speed of the pump.
A. RTU C. SCADA system
B. HMI D. None of the Above

397. A ‘supervisory Station’ refers to the software and servers responsible for communication with the field equipment (PLCs, RTUs etc.), and after that, to _____ software running on the workstations in the control room, or somewhere else.

A. RTU C. SCADA system
B. HMI D. None of the Above

398. Which of the following terms can have multiple servers, disaster recovery sites and distributed software applications in larger SCADA systems?

A. Master station C. SCADA system(s)
B. SCADA implementation(s) D. None of the Above

399. For increasing the system integrity, _____are occasionally configured in hot standby or dual-redundant formation, providing monitoring and continuous control during server failures.

A. Multiple servers C. Multiple stations
B. Independent systems D. None of the Above

400. The monitoring function or remote management of the _____ is referred to as telemetry.

A. SCADA operator C. SCADA system(s)
B. SCADA implementation(s) D. None of the Above