Hydraulic Machines

1. Hydraulic machines operate on the principle of:

(A) Pascal’s law

(B) Boyle’s law

(C) Charles’ law

(D) Newton’s law

Answer: A) Pascal’s law

2. A pump is a machine used to:

(A) Raise liquid

(B) Lower liquid

(C) Measure flow

(D) Mix liquids

Answer: A) Raise liquid

3. The most commonly used pump in households is:

(A) Centrifugal pump

(B) Reciprocating pump

(C) Gear pump

(D) Screw pump

Answer: A) Centrifugal pump

4. Reciprocating pumps are best suited for:

(A) Low discharge, high head

(B) High discharge, low head

(C) High discharge, high head

(D) Low discharge, low head

Answer: A) Low discharge, high head

5. In a centrifugal pump, the liquid enters at:

(A) Center (eye)

(B) Periphery

(C) Base

(D) Nozzle

Answer: A) Center (eye)

6. The efficiency of a pump is maximum at:

(A) Best efficiency point

(B) Zero flow

(C) Maximum head

(D) Half speed

Answer: A) Best efficiency point

7. A turbine converts:

(A) Hydraulic energy to mechanical energy

(B) Mechanical energy to hydraulic energy

(C) Electrical energy to hydraulic energy

(D) None

Answer: A) Hydraulic energy to mechanical energy

8. Kaplan turbine is a type of:

(A) Reaction turbine

(B) Impulse turbine

(C) Mixed flow turbine

(D) Axial flow pump

Answer: A) Reaction turbine

9. Pelton wheel is suitable for:

(A) High head, low discharge

(B) Low head, high discharge

(C) High head, high discharge

(D) Low head, low discharge

Answer: A) High head, low discharge

10. Francis turbine is a:

(A) Mixed flow turbine

(B) Axial flow turbine

(C) Radial flow turbine

(D) Impulse turbine

Answer: A) Mixed flow turbine

11. The function of a draft tube in a reaction turbine is to:

(A) Recover kinetic energy

(B) Increase velocity

(C) Increase pressure

(D) Prevent cavitation

Answer: A) Recover kinetic energy

12. Manometric head is:

(A) Actual head against which pump works

(B) Static head

(C) Suction head

(D) Delivery head

Answer: A) Actual head against which pump works

13. Cavitation in pumps is caused by:

(A) Low pressure

(B) High velocity

(C) High pressure

(D) Low velocity

Answer: A) Low pressure

14. The main function of an air vessel in a reciprocating pump is to:

(A) Smoothen flow

(B) Increase discharge

(C) Reduce pressure

(D) Decrease suction head

Answer: A) Smoothen flow

15. The hydraulic efficiency of a turbine is:

(A) Power delivered to runner/Water power

(B) Power to shaft/Water power

(C) Power delivered to shaft/Power delivered to runner

(D) Water power/Runner power

Answer: A) Power delivered to runner/Water power

16. The specific speed of a pump is:

(A) Speed at which pump would deliver unit discharge at unit head

(B) Actual operating speed

(C) Speed at maximum head

(D) Speed at no load

Answer: A) Speed at which pump would deliver unit discharge at unit head

17. Multistage pumps are used to:

(A) Increase head

(B) Increase flow

(C) Decrease head

(D) Decrease flow

Answer: A) Increase head

18. The slip of a reciprocating pump is defined as:

(A) Difference between theoretical and actual discharge

(B) Difference between actual and theoretical discharge

(C) Ratio of actual to theoretical discharge

(D) None

Answer: A) Difference between theoretical and actual discharge

19. Priming is necessary for:

(A) Centrifugal pump

(B) Reciprocating pump

(C) Axial pump

(D) All pumps

Answer: A) Centrifugal pump

20. In Pelton wheel, the hydraulic efficiency is maximum when the speed ratio is:

(A) 0.46

(B) 0.5

(C) 1

(D) 0.9

Answer: B) 0.5

21. 'Runaway speed' of a hydraulic turbine is:

(A) Speed at which turbine runs when load is removed suddenly

(B) Maximum permissible speed

(C) Minimum permissible speed

(D) Rated speed

Answer: A) Speed at which turbine runs when load is removed

22. The function of guide vanes in a reaction turbine is:

(A) Regulate flow

(B) Increase speed

(C) Reduce friction

(D) Control pressure

Answer: A) Regulate flow

23. In a centrifugal pump, maximum efficiency is obtained when:

(A) Velocity of flow equals velocity of whirl

(B) Velocity of flow is half velocity of whirl

(C) Both are equal

(D) Head is maximum

Answer: A) Velocity of flow equals velocity of whirl

24. Cavitation occurs when:

(A) Pressure falls below vapor pressure

(B) Pressure rises above atmospheric

(C) Velocity is zero

(D) Temperature is low

Answer: A) Pressure falls below vapor pressure

25. Characteristic curve of a pump represents relation between:

(A) Discharge, head, power

(B) Speed, power

(C) Discharge, pressure

(D) Head, speed

Answer: A) Discharge, head, power

26. Hydraulic accumulator is used for:

(A) Storing liquid under pressure

(B) Heating the liquid

(C) Filtering the fluid

(D) Cooling the fluid

Answer: A) Storing liquid under pressure

27. In a centrifugal pump, the impeller is connected to:

(A) Electric motor

(B) Shaft

(C) Belt

(D) Pulley

Answer: B) Shaft

28. The main function of stuffing box in pump is:

(A) Prevent leakage

(B) Increase pressure

(C) Increase flow

(D) Reduce wear

Answer: A) Prevent leakage

29. Jet ratio in Pelton wheel is:

(A) Ratio of pitch circle diameter to nozzle diameter

(B) Ratio of blade diameter to jet diameter

(C) Ratio of head to speed

(D) Ratio of efficiency to discharge

Answer: A) Ratio of pitch circle diameter to nozzle diameter

30. Maximum efficiency of Kaplan turbine is attained at:

(A) Full gate opening

(B) Half gate opening

(C) Minimum gate opening

(D) No gate opening

Answer: A) Full gate opening

31. Axial flow pump is also called:

(A) Propeller pump

(B) Reciprocating pump

(C) Centrifugal pump

(D) Screw pump

Answer: A) Propeller pump

32. The discharge is maximum in reciprocating pump when:

(A) Slip is zero

(B) Air vessels are not used

(C) Head is maximum

(D) Crank angle is zero

Answer: A) Slip is zero

33. The efficiency of a hydraulic press is:

(A) Output/Input

(B) Input/Output

(C) Output/Weight

(D) Weight/Input

Answer: A) Output/Input

34. Direction of rotation of centrifugal pump is determined by:

(A) Blade configuration

(B) Motor direction

(C) Impeller shape

(D) Vane number

Answer: B) Motor direction

35. The total head developed by a pump is the sum of:

(A) Static, velocity, and pressure head

(B) Static and velocity head

(C) Static and pressure head

(D) Only velocity head

Answer: A) Static, velocity, and pressure head

36. Leakage in pumps reduces:

(A) Actual discharge

(B) Theoretical discharge

(C) Input power

(D) Output power

Answer: A) Actual discharge

37. Hydraulic intensifier is used for:

(A) Increasing intensity of pressure

(B) Increasing temperature

(C) Increasing speed

(D) Increasing velocity

Answer: A) Increasing intensity of pressure

38. In deep well pumps, the type generally used is:

(A) Turbine pump

(B) Jet pump

(C) Centrifugal pump

(D) Peristaltic pump

Answer: A) Turbine pump

39. If delivery valve of reciprocating pump is closed, the pump will:

(A) Stop

(B) Damage itself

(C) Run at same speed

(D) Reduce flow

Answer: B) Damage itself

40. In a reaction turbine, the sum of pressure head and velocity head at inlet is:

(A) Constant

(B) Decreases

(C) Increases

(D) Zero

Answer: A) Constant

41. The speed ratio of a Kaplan turbine is about:

(A) 2.0

(B) 1.0

(C) 0.7

(D) 0.5

Answer: C) 0.7

42. Vane angle in centrifugal pump affects:

(A) Discharge

(B) Head

(C) Efficiency

(D) All of these

Answer: D) All of these

43. Cavitation in turbines leads to:

(A) Blade damage

(B) Increased efficiency

(C) Reduced vibration

(D) Silence

Answer: A) Blade damage

44. Hydraulic ram works on the principle of:

(A) Water hammer

(B) Centrifugal action

(C) Pressure reduction

(D) None of these

Answer: A) Water hammer

45. The minimum speed at which a centrifugal pump starts delivering is:

(A) Cut-off speed

(B) Minimum speed

(C) Critical speed

(D) Initial speed

Answer: C) Critical speed

46. The component which converts mechanical power into hydraulic power is:

(A) Pump

(B) Turbine

(C) Accumulator

(D) Motor

Answer: A) Pump

47. Head loss due to friction in pipes is calculated by:

(A) Darcy-Weisbach equation

(B) Bernoulli’s equation

(C) Pascal’s law

(D) Euler’s equation

Answer: A) Darcy-Weisbach equation

48. A gear pump is a type of:

(A) Positive displacement pump

(B) Dynamic pump

(C) Reaction pump

(D) Jet pump

Answer: A) Positive displacement pump

49. The main difference between a pump and a turbine is:

(A) Direction of energy conversion

(B) Speed

(C) Size

(D) Shape

Answer: A) Direction of energy conversion

50. Volute chamber in centrifugal pump is provided to:

(A) Increase flow area

(B) Reduce velocity and convert into pressure

(C) Increase velocity

(D) Decrease efficiency

Answer: B) Reduce velocity and convert into pressure

51. Typical application of reciprocating pump is for:

(A) High heads, low flows

(B) Low heads, high flows

(C) High heads, high flows

(D) Constant flows

Answer: A) High heads, low flows

52. Deep well turbine pumps are most suitable for:

(A) Lifting water from deep wells

(B) Lifting oil from tank

(C) Irrigation

(D) Urban supply

Answer: A) Lifting water from deep wells

53. The thrust bearing in a pump carries:

(A) Axial load

(B) Radial load

(C) Both loads

(D) Torsional load

Answer: A) Axial load

54. The impeller of a centrifugal pump is generally made of:

(A) Bronze

(B) Cast iron

(C) Aluminium

(D) Copper

Answer: B) Cast iron

55. An orifice meter is used to measure:

(A) Flow rate

(B) Pressure

(C) Speed

(D) Level

Answer: A) Flow rate

56. Centrifugal pump delivers maximum efficiency at:

(A) Design point

(B) Zero discharge

(C) Maximum head

(D) No load

Answer: A) Design point

57. The self-priming pump is capable of:

(A) Delivering water even when partially filled

(B) Delivering air

(C) Delivering only solids

(D) None

Answer: A) Delivering water even when partially filled

58. Jet pump is a combination of:

(A) Centrifugal and reciprocating pump

(B) Centrifugal and jet

(C) Reciprocating pump and orifice

(D) Centrifugal pump and air vessel

Answer: B) Centrifugal and jet

59. Reaction turbines require:

(A) Full supply of water

(B) Partial supply

(C) No supply

(D) Air

Answer: A) Full supply of water

60. The efficiency of hydraulic machines depends on:

(A) Design and operation

(B) Size

(C) Surface finish

(D) Colour

Answer: A) Design and operation

61. Main disadvantage of centrifugal pumps is:

(A) Not suitable for high heads

(B) Not suitable for high discharge

(C) Extreme noise

(D) Difficult maintenance

Answer: A) Not suitable for high heads

62. Net positive suction head (NPSH) is important to avoid:

(A) Cavitation

(B) Vibration

(C) Noise

(D) Leakage

Answer: A) Cavitation

63. Cavitation is more likely in:

(A) High temperature liquids

(B) Low pressure zones

(C) Both

(D) None

Answer: C) Both

64. Runner of a Pelton wheel is made of:

(A) Cast steel

(B) Bronze

(C) Cast iron

(D) Aluminium

Answer: A) Cast steel

65. Hydraulic jump is used to:

(A) Dissipate energy

(B) Increase speed of water

(C) Increase head

(D) Mix water

Answer: A) Dissipate energy

66. Work done by water on runner per second is equal to:

(A) Change of angular momentum

(B) Sum of velocities

(C) Linear velocity

(D) Change of pressure

Answer: A) Change of angular momentum

67. The unit power of turbine is power developed per:

(A) Unit head

(B) Unit discharge

(C) Unit speed

(D) Unit weight

Answer: A) Unit head

68. Hydraulic intensifier increases:

(A) Pressure

(B) Velocity

(C) Flow rate

(D) Speed

Answer: A) Pressure

69. In Pelton wheel, buckets are made of:

(A) Cast iron

(B) Cast steel

(C) Aluminium

(D) Brass

Answer: B) Cast steel

70. The pressure at exit of turbine is:

(A) Atmospheric or below

(B) Above atmospheric

(C) Zero

(D) Maximum possible

Answer: A) Atmospheric or below

71. The delivery pipe of a reciprocating pump is made of:

(A) GI

(B) Cast iron

(C) Steel

(D) PVC

Answer: B) Cast iron

72. Brake horsepower is:

(A) Theoretical power

(B) Actual power delivered by pump

(C) Power loss

(D) Power at shaft

Answer: D) Power at shaft

73. Vane angle at exit of impeller in a centrifugal pump is:

(A) 20–30 degrees

(B) 90 degrees

(C) 45 degrees

(D) 75 degrees

Answer: A) 20–30 degrees

74. Pressure energy in a fluid is measured in units of:

(A) Nm

(B) Nm^2

(C) N/m^2

(D) Nm^3

Answer: C) N/m^2

75. The main difference between positive displacement and centrifugal pumps is:

(A) Output flow is fixed for positive displacement pumps

(B) Output depends on head for centrifugal

(C) Both

(D) None

Answer: C) Both

76. Most hydraulic turbines operate with:

(A) Water as working fluid

(B) Air

(C) Oil

(D) Steam

Answer: A) Water as working fluid

77. Viscosity is an important property for:

(A) Hydraulic oils

(B) Air

(C) Steel

(D) Water

Answer: A) Hydraulic oils

78. Cavitation can be reduced by:

(A) Increasing NPSH

(B) Reducing velocity

(C) Reducing temperature

(D) All of these

Answer: D) All of these

79. Main cause of pump failure is:

(A) Pump running dry

(B) High pressure

(C) Low speed

(D) Low efficiency

Answer: A) Pump running dry

80. The performance curves of a pump are supplied by:

(A) Manufacturer

(B) Government

(C) Mechanic

(D) Owner

Answer: A) Manufacturer

81. Draft tube in turbines increases:

(A) Efficiency

(B) Velocity

(C) Flow

(D) Pressure

Answer: A) Efficiency

82. In a centrifugal pump, increasing impeller speed:

(A) Increases discharge and head

(B) Decreases discharge

(C) Decreases efficiency

(D) Has no effect

Answer: A) Increases discharge and head

83. A double acting reciprocating pump delivers:

(A) Flow during both strokes

(B) Only in one direction

(C) In two tanks

(D) Alternately

Answer: A) Flow during both strokes

84. Jet pumps are commonly used for:

(A) Lifting water from wells

(B) Oil drilling

(C) Sand transport

(D) All of these

Answer: A) Lifting water from wells

85. The weight of water is taken as:

(A) 9.81 kN/m^3

(B) 1000 N/m^3

(C) 9810 N/m^3

(D) 10 kN/m^3

Answer: A) 9.81 kN/m^3

86. Pelton wheel has:

(A) One jet

(B) Multiple jets

(C) One or more jets

(D) No jet

Answer: C) One or more jets

87. Most common problem in reciprocating pumps is:

(A) Leakage

(B) Overheating

(C) Blockage

(D) All of these

Answer: D) All of these

88. Brake horsepower is always:

(A) Less than indicated horsepower

(B) More than indicated horsepower

(C) Equal

(D) Zero

Answer: A) Less than indicated horsepower

89. Propeller turbine is used for:

(A) Low head, large discharge

(B) High head, small discharge

(C) Moderate head, moderate discharge

(D) None

Answer: A) Low head, large discharge

90. Turbine with adjustable guide vanes is:

(A) Kaplan turbine

(B) Francis turbine

(C) Pelton wheel

(D) Mixed flow turbine

Answer: A) Kaplan turbine

91. Foot valve in pump is used for:

(A) Retaining water in suction pipe

(B) Preventing entry of debris

(C) Adjusting flow

(D) None

Answer: A) Retaining water in suction pipe

92. Pump performance drops due to:

(A) Wear and tear

(B) Cavitation

(C) Blockages

(D) All of these

Answer: D) All of these

93. Francis turbine is best suited for:

(A) Medium head

(B) High head

(C) Low head

(D) Very high head

Answer: A) Medium head

94. “Priming” fills the:

(A) Suction side of pump with liquid

(B) Delivery side with air

(C) Entire pump with vapour

(D) None

Answer: A) Suction side of pump with liquid

95. A hydraulic press is a:

(A) Force multiplying machine

(B) Speed increasing machine

(C) Energy loss device

(D) Velocity increasing machine

Answer: A) Force multiplying machine

96. In a reciprocating pump, negative slip occurs when:

(A) Acceleration head is very high

(B) Suction pipe is long

(C) Discharge pipe is short

(D) Both A and C

Answer: D) Both A and C

97. Natural frequency of hydraulic system is important for:

(A) Avoiding resonance

(B) Increasing efficiency

(C) Improving speed

(D) Reducing pressure

Answer: A) Avoiding resonance

98. Priming is required for centrifugal pumps to:

(A) Remove air pockets

(B) Improve efficiency

(C) Lower head

(D) Increase discharge

Answer: A) Remove air pockets

99. The gear pumps are used for:

(A) Low volume, high pressure

(B) High volume, low pressure

(C) High efficiency

(D) High speed

Answer: A) Low volume, high pressure

100. Hydraulic efficiency is improved by:

(A) Good design

(B) Regular maintenance

(C) Reducing losses

(D) All of these

Answer: D) All of these

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