

1. If 'L' is the span of a light suspension bridge, whose, each cable carries total weight (w) and the central dip is 'y', the horizontal pull at each support is \_\_\_\_\_.

- A.  $wL/4y$                       B.  $wL/8y$   
 C.  $wL/2y$                       D.  $wL/y$

Ans. B

2. The vehicle moving on a level circular path will exert pressure such that \_\_\_\_\_.

- A. the reaction on the outer wheels will be more  
 B. the reaction on the inner wheels will be more  
 C. the reaction on the inner wheels as well as on the outer wheels will be equal  
 D. it depends on the speed

Ans. A

Sol. centrifugal force pushes the car outwards. Since the center of mass of the car is above the level of the wheels, it tends to create a moment which pushes the outer wheels down and the inner wheels up. Since the outer wheels are being pushed downwards, the ground exerts a greater normal force on the outer wheels.

3. Which one of the following laws is not applicable for a simple pendulum?

- A. the time period does not depend on its magnitude  
 B. the time period is proportional to its length  
 C. the time period is proportional to square root of its length  
 D. the time period is inversely proportional to square root of its acceleration due to gravity

Ans. C

Sol.  $T = 2\pi \sqrt{\frac{L}{g}}$  where L, length of pendulum and g is local gravity acceleration

4. In order to double the period of a simple pendulum \_\_\_\_\_.

- A. the mass of its bob should be doubled  
 B. the mass of its bob should be quadrupled  
 C. its length should be doubled  
 D. its length should be quadrupled

Ans. D

Sol. Time period of simple pendulum

$T = 2\pi \sqrt{\frac{L}{g}}$  where L, length of pendulum and g is local gravity acceleration

In order to double the time period it is required to quadrupled the length of pendulum

5. A body is vibrating at 10 vibrations/second in Simple Harmonic Motion of 10 cm amplitude. The maximum velocity in cm/sec can be \_\_\_\_\_.

- A.  $100\pi$                       B.  $50\pi$

- C.  $200\pi$                       D. 100

Ans. C

Sol. For velocity to be maximum in SHM

$$V_{max} = 2\pi fA$$

Where, f is frequency and a is maximum amplitude.

$$V_{max} = 2\pi \times 10 \times 10 = 200\pi$$

6. The sum of kinetic and potential energy of a falling body \_\_\_\_\_.

- A. is constant at all points  
 B. varies from point to point  
 C. is maximum at starting and goes on increasing  
 D. is maximum at starting and goes on decreasing

Ans. A

Sol. The sum of the PE and KE is the total energy, which is a constant for a body.

7. If two bodies, one light and other heavy, have equal kinetic energy, which one has a greater momentum?

- A. the heavy body  
 B. the light body  
 C. both have equal momentum  
 D. unpredictable

Ans. A

Sol. *mometum of body* =  $mv$

Where, m mass of the body and v is the velocity of the body, hence the heavier body will have higher momentum.

8. A bucket of water weighing 10 kg is pulled up from a 20 m deep well by a rope weighing 1 kg/m length, then the work done is \_\_\_\_\_.

- A. 200 kg-m                      B. 400 kg-m  
 C. 500 kg-m                      D. 600 kg-m

Ans. B

Sol. Total work done will be sum of work done to pull the bucket and work done required to pull the rope.

$$dW = (W_{bucket} + W_{rope}) \times dx$$

$$dW = (10 + x)dx$$

$$W = \int_0^{20} (10 + x)dx = 400 \text{ Kg} - m$$

9. Which of the following is an example of a body undergoing translational equilibrium?

- A. a body at rest on a table  
 B. a body travelling in a circular path at a constant speed  
 C. a body rotating with constant angular speed about an axis  
 D. a body sliding down a frictionless inclined plane

Ans. A

Sol. Translational equilibrium is achieved when there is no change in body position with respect to time and space at given instance.

10. A boy is swinging on a swing. If another boy sits along with him without disturbing his motion, then the time period of wing will \_\_\_\_\_.
- A. increase                      B. decrease  
C. be doubled                    D. remain the same

Ans. D

Sol. The swing is behaving like a simple pendulum

$$T = 2\pi \sqrt{\frac{L}{g}}$$

which is independent of the hanging mass.

11. The type of motion when the acceleration is proportional to displacement is called \_\_\_\_.
- A. translation                    B. rotational  
C. gyroscopic                    D. simple harmonic

Ans. D

Sol. Acceleration in SHM is given by.

$$a = \omega^2 x$$

Where x is displacement.

12. The escape velocity of a body on earth \_\_\_\_\_.
- A. increases with the increase of its mass  
B. decreases with the increase of its mass  
C. remains unchanged with variation of mass  
D. varies as the square of the change in mass

Ans. C

Sol. Escape velocity of body is given as

$$V_{escape} = \sqrt{\frac{2GM}{r}}$$

Which is independent of mass of given body.

13. The velocity of the satellite in an orbit close to earth's surface depends on \_\_\_\_\_.
- A. radius of the orbit only  
B. acceleration due to gravity only  
C. square root of product of radius of the orbit and acceleration due to gravity  
D. product of radius of the orbit and gravitational constant

Ans. C

Sol. Velocity of satellite

$$V = \sqrt{\frac{GM}{R}}$$

$$g = \frac{GM}{R^2}$$

Hence,  $V = \sqrt{gR}$

14. A circular disc rolls down an inclined plane, the fraction of its total energy associated with its rotation is \_\_\_\_\_.
- A. 1/2                                B. 1/3  
C. 1/4                                D. 2/3

Ans. B

Sol. Kinetic energy associated with circular disc

$$V_{KE} = \frac{1}{2} MV^2$$

Rotational energy associated with circular disc

$$V_{RE} = \frac{1}{2} I \omega^2$$

For circular disc  $I = \frac{1}{2} MR^2$  and  $V = R\omega$

$$\text{Hence, } \frac{\text{Rotational energy}}{\text{total energy}} = \frac{0.5MV^2}{0.5MV^2 + 0.25MV^2} = \frac{1}{3}$$

15. An object weighs 60 gm in air, 50 gm in water and 40 gm in oil. Then the specific gravity of the oil will be \_\_\_\_\_.
- A. 0.25                                B. 1  
C. 1.5                                 D. 2

Ans. D

Sol. The relative density of an object is equal to the ratio of its weight in air and the difference of its weight in air and its weight when the object is submerged in water.

$$D = \frac{W_a}{W_a - W_w}$$

From the given data  $D = [60/(60-50)]$

$$\Rightarrow D = (60/10)$$

$$\Rightarrow D = 6$$

Relative density of oil can be calculated as,  
 $\Rightarrow$  Relative density of oil = Loss in weigh in oil/ Loss in weigh in water

$$\Rightarrow \text{Relative density of oil} = (60 - 40)/(60 - 50)$$

$$\Rightarrow \text{Relative density of oil} = 20/10$$

$$\Rightarrow \text{Relative density of oil} = 2$$

16. The value of coefficient of velocity compared to coefficient of discharge \_\_\_\_\_.
- A. is less                                B. is more  
C. has no relation                    D. is the same

Ans. B

Sol. Coefficient of velocity is varies between 0.98 to 0.99, and coefficient of discharge is varies between 0.67 to 0.69.

17. Property of a fluid by which molecules of different kinds of fluids are attracted to each other is called \_\_\_\_\_.
- A. adhesion                            B. cohesion  
C. viscosity                            D. compressibility

Ans. A

Sol. **Adhesion** is the attraction of molecules of one kind for molecules of a different kind, and it can be quite strong for water.

18. The depth of water below the spillway and after hydraulic jump are 1 m and 6 m respectively. The head loss will be \_\_\_\_\_.
- A. 1.04 m                                B. 5 m  
C. 1.7 m                                 D. 2.05 m

Ans. A

Sol. Head loss in spillway

$$H_m = \frac{(Y_2 - Y_1)^2}{4Y_1Y_2} = \frac{(6-1)^2}{4 \times 6 \times 1} = \frac{25}{24} = 1.041$$

19. If no resistance is encountered by displacement, such a substance is known as \_\_\_\_\_.  
 A. fluid                                      B. water  
 C. gas                                         D. ideal fluid

Ans. D

Sol. Inviscid or ideal flow has no resistance for relative motion between fluid layers.

20. Head loss in turbulent flow in a pipe \_\_\_\_\_.  
 A. varies directly as velocity  
 B. varies inversely as square of velocity  
 C. varies approximately as square of velocity  
 D. depends upon orientation of pipe

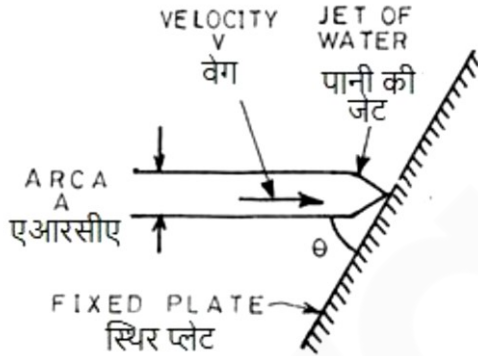
Ans. C

Sol. Head loss in turbulent flow is given as,

$$head\ loss = \frac{f\rho v^2}{2D}$$

where  $f$  friction factor,  $\rho$  density of fluid,  $v$  velocity of fluid,  $d$  diameter of pipe.

21. The force exerted by the jet on fixed plate shown in the figure below is equal to:



- A.  $AV^2 \sin \theta$                                       B.  $\rho AV^2 \sin \theta$   
 C.  $\rho AV^2 \cos \theta$                                       D.  $AV^2 \tan \theta$

Ans. B

Sol. Force exerted by jet on vertical plate is,

$$F = \rho aV^2$$

Now if plate is inclined at an angle  $\theta$

Then force in the the direction of flow on inclined surface will be

$$F = \rho aV^2 \sin \theta$$

22. A weir system in which the downstream water level of the weir nappe is higher than the crest is called \_\_\_\_\_.  
 A. submerged                                      B. overflowing  
 C. broad-crested                                      D. cipoletti

Ans. A

Sol. The ratio of the downstream and the upstream water depths above the weir crest is defined as the submergence ratio. For above system it will be submerged.

23. For starting an axial flow pump, its delivery valve should be \_\_\_\_\_.  
 A. closed  
 B. open  
 C. depends on starting condition and flow desired  
 D. could be either open or closed

Ans. B

Sol. To maintain NPSH in axial flow pump it is required to open its delivery valve kept open.

24. Equation of continuity results from the principal of conservation of \_\_\_\_\_.  
 A. energy                                      B. flow  
 C. mass                                         D. momentum

Ans. C

Sol. Equation of continuity is,

$$AV = constant$$

Where A area of of cross section and V is velocity of fluid, which clearly shows that Equation of continuity results from the principal of conservation of mass.

25. When a piping system is made up primarily of friction head and very little of vertical lift, then pipe characteristic should be \_\_\_\_\_.  
 A. horizontal                                      B. nearly horizontal  
 C. very steep                                      D. first rise and then fall

Ans. B

Sol.

26. The hydraulic mean depth for a circular pipe of diameter 'd' running full is equal to \_\_\_\_\_.  
 A. d    B. d/3  
 C. d/2    D. d/4

Ans. D

Sol. Hydraulic mean depth is defined as the area of the flow section divided by the top water surface width.

$$H_m = \frac{\pi D^2}{4} \div \pi D$$

$$H_m = \frac{D}{4}$$

27. In a centrifugal pump, the liquid enters the pump from \_\_\_\_\_.  
 A. the top    B. the bottom  
 C. the centre    D. from sides

Ans. C

Sol. In centrifugal pump fluid enter at the center and come out from the periphery of the pump

28. Head loss in a flowing fluid is experienced due to \_\_\_\_\_.  
 A. friction at surface  
 B. change of direction  
 C. change of section of passage  
 D. obstruction in passage

- A. only A                      B. only B  
C. only B and C              D. A, B, C and D

Ans. D

Sol. Head loss in a flowing fluid is experienced due to all the above reason stated.

29. High specific speed of turbine implies that it is \_\_\_\_\_.
- A. propeller turbine    B. Francis turbine  
C. Impulse turbine    D. Francis turbine or impulse turbine

Ans. A

Sol. Impulse turbines have the lowest  $n_s$  values, typically ranging from 1 to 10, a Pelton wheel is typically around 4, Francis turbines fall in the range of 10 to 100, while Kaplan turbines are at least 100 or more. propeller turbine High specific speed of turbine

30. One dimensional flow is \_\_\_\_\_.
- A. restricted to flow in a straight line  
B. uniform flow  
C. one which neglects changes in a transverse direction  
D. the most general flow

Ans. C

Sol. Term one, two or three dimensional flow refers to the number of space coordinated required to describe a flow.

31. Specific speed of a turbine depends upon \_\_\_\_\_.
- A. speed, power and discharge  
B. discharge and power  
C speed and head  
D. speed, power and head

Ans. D

Sol. Specific speed of turbine,

$$N_s = N \frac{\sqrt{P}}{H^{\frac{5}{4}}}$$

32. If a mouthpiece is running full at the outlet, the vacuum at vena-contracta \_\_\_\_\_.
- A. increases velocity of jet  
B. decreases velocity of jet  
C. decreases the discharge  
D. decreases the value of coefficient of contraction

Ans. A

Sol. The vacuum at vena- contracta will result in pressure drop in that region and leads to increase th velocity of jet.

33. When a fluid flows in concentric circles, it is known as \_\_\_\_\_.
- A. free circular motion  
B. free rotational motion  
C. free spinal vortex flow

- D. free cylindrical vortex flow

Ans. D

Sol. A cylindrical free vortex motion is conceived in a cylindrical coordinate system with axis z directing vertically upwards where at each horizontal cross-section, there exists a planar free vortex motion

34. Maximum impulse will be developed in hydraulic ram when \_\_\_\_\_.
- A. when valve closes suddenly  
B. supply pipe is long  
C. supply pipe is short  
D. ram chamber is large

Ans. A

Sol. When valve is closed suddenly all the flow energy will br converted to pressure energy and generate maximum impulse in hydraulic ram.

35. Critical-depth meter is used to measure \_\_\_\_\_.
- A. discharge in an open channel  
B. hydraulic jump  
C. depth of flow in channel  
D. depth of channel

Ans. A

Sol. Critical-depth meter is used to measure discharge in open channel.

36. Medium specific speed of a pump implies that it is \_\_\_\_\_.
- A. centrifugal pump  
B. mixed flow pump  
C. axial flow pump  
D. axial flow pump or centrifugal pump

Ans. B

Sol. Medium specific speed of a pump implies that it is mixed flow pump as it is used for medium head available.

37. The hydraulic grade line is \_\_\_\_\_.
- A. always moving up  
B. always moving down  
C. always above the energy grade line  
D. the velocity head below the energy grade line

Ans. D

Sol. Hydraulic grade line is pizeometric head and always below the total energy line.

38. The ratio of depth of bucket for Pelton Wheel to the diameter of jet is of the order of \_\_\_\_.
- A. 1                              B. 1.2  
C. 1.5                          D. 1.8

Ans. B

Sol. The ratio of depth of bucket for Pelton Wheel to the diameter of jet is of the order of 1.2

39. The contraction of area for flow through orifice in tank depends on \_\_\_\_\_.

- A. shape of orifice  
 B. size of orifice  
 C. head in tank  
 A. only A                      B. only A and B  
 C. only A and C              D. A, B and C

Ans. D

Sol. The flow of fluid through a contraction (decrease in pipe diameter) results in an increase in the velocity and consequently, a pressure drop greater than the value for the equivalent straight pipe. Which depend on shape of orifice, size of orifice and head in tank.

40. The flow at critical depth in an open channel is \_\_\_\_\_.
- A. maximum                      B. minimum  
 C. zero                              D. half of normal flow

Ans. A

Sol. Critical depth is defined as the depth of flow where energy is at a minimum for a particular discharge.

41. In Kaplan turbine runner, the number of blades is generally of the order \_\_\_\_\_.
- A. 2 – 4                              B. 4 – 8  
 C. 8 – 16                            D. 16 – 24

Ans. B

Sol Kaplan turbine is mix flow type turbine in which number of blade varies from 4 to 8.

42. Air vessels in reciprocating pump are used to \_\_\_\_\_.
- A. smoothen flow  
 B. reduce acceleration to minimum  
 C. increase pump efficiency  
 D. save pump from cavitation

Ans. B

Sol. using air vessel, work is saved by eliminating the work lost in friction during the acceleration and deceleration of the fluid.

43. A hydraulic intensifier normally consists of \_\_\_\_\_.
- A. two cylinders, two rams and a storage device  
 B. a cylinder and a ram  
 C. two co-axial rams and two cylinders  
 D. a cylinder, a piston, storage tank and control valve

Ans. C

Sol. hydraulic intensifier constructed by mechanically connecting two pistons, each working in a separate cylinder of a different diameter

44. Cavitation is caused by \_\_\_\_\_.
- A. high velocity                  B. high pressure  
 C. weak material                D. low pressure

Ans. D

Sol. Suction **cavitation** occurs when the pump suction is under a low-pressure/high-vacuum condition where the liquid turns into a vapor at the eye of the pump impeller

45. Which of the following pumps is used for pumping viscous fluids?
- A. centrifugal pump  
 B. screw pump  
 C. reciprocating pump  
 D. jet pump

Ans. B

Sol. screw pump pumps is used for pumping viscous fluids

46. Steel whose elements are used for the purpose of modifying the mechanical properties of plain carbon steel is called \_\_\_\_\_.
- A. Alloy steel                      B. Invar  
 C. Stainless steel                D. High speed steel

Ans. A

Sol. Alloy steel is a steel that has had small amounts of one or more alloying elements (other than carbon) such as such as manganese, silicon, nickel, titanium, copper, chromium and aluminum added.

47. Alloy steel containing 36% nickel is called \_\_\_\_\_.
- A. Invar                              B. Stainless steel  
 C. High speed steel              D. None of these

Ans. A

Sol. Invar is a nickel-iron alloy notable for its uniquely low coefficient of thermal expansion

48. Carbon steel is \_\_\_\_\_.
- A. Produced by adding carbon in steel  
 B. an alloy of iron and carbon with varying quantities of phosphorus and sulphur  
 C. purer than the cast iron  
 D. None of these

Ans. B

Sol. Carbon steel, or plain-carbon steel, is a metal alloy. It is a combination of two elements, iron and carbon. Other elements are present in quantities too small to affect its properties.

49. Percentage of carbon in steel is \_\_\_\_\_.
- A. 0.1% to 0.8%                  B. 0.35% to 0.45%  
 C. 1.8% to 4.2%                  D. 0.1% to 1.5%

Ans. D

Sol carbon content in steel,  
 Low carbon steel- upto 0.3%  
 Medium carbon steel-0.3-0.6%  
 High carbon steel- 0.6-1%  
 Ultra high carbon steel-upto 1.5%

50. Hardness of steel depends on \_\_\_\_\_.
- A. amount of cementite it contains

- B. amount of carbon it contains
- C. contents of alloying elements
- D. method of manufacture of steel

Ans. B

Sol. the hardness of a carbon steel depends on its carbon content

51. \_\_\_\_\_ is added to raise the yield point of low carbon steel.

- A. Silicon
- B. Carbon
- C. Phosphorous
- D. Sulphur

Ans. C

Sol. To increase yield point of low carbon steel phosphorous is added as alloying element.

52. An alloy steel contains \_\_\_\_\_.

- A. more than 0.5% Mn and 0.5% Si
- B. less than 0.5% Mn and 0.5% Si
- C. more than 0.35% Mn and 0.5% Si
- D. less than 0.35% Mn and 0.5% Si

Ans. A

Sol. Alloy steels are derivative of carbon steels where some typical elements are added to achieve desired property. An iron based steel is consider to be Alloy steel when manganese is greater than 0.165%,silicon over 0.5% copper over 0.6%.

53. Alloy steel as compared to carbon steel is more \_\_\_\_\_.

- A. tough
- B. b
- C. fatigue resistance
- A. only A
- B. only B
- C. only C
- D. None of these

Ans. D

Sol. Alloy steel is a type of steel that has presence of certain other elements apart from iron and carbon. Commonly added elements in alloy steel are manganese, silicon, boron, chromium, vanadium and nickel. The quantity of these metals in alloy steel is primarily dependent upon the use of such steel. Normally alloy steel is made to get desired physical characteristics in the steel.

Carbon steel is also known as plain steel and is an alloy of steel where carbon is the main constituent and no minimum percentage of other alloying elements is mentioned. Carbon steel is not stainless steel as it is classified under alloy steels. As the name implies, carbon content is increased in the steel making it harder and stronger through application of heat treatments. However, addition of carbon makes the steel less ductile. The weldability of carbon steel is low and higher carbon content also lowers the melting point of the alloy.

54. Steel which destroys by burning is called \_\_\_\_\_.

- A. Alloy steel
- B. Carbon steel
- C. Silicon steel
- D. Killed steel

Ans. D

Sol. **Killed steel** is **steel** that has been completely deoxidized by the addition of an agent before casting

55. In steel, main alloy causing corrosion resistance is \_\_\_\_\_.

- A. Manganese
- B. Vanadium
- C. Chromium
- D. Cobalt

Ans. C

Sol. Chromium is the most important alloying element and it gives stainless steels their basic corrosion resistance. All stainless steels have a Cr content of at least 10.5% and the corrosion resistance increases the higher chromium content. Chromium also increases the resistance to oxidation at high temperatures and promotes a ferritic microstructure

56. The crest diameter of a screw thread is same as \_\_\_\_\_.

- A. major diameter
- B. minor diameter
- C. pitch diameter
- D. core diameter

Ans. A

Sol. Crest, The surface of the thread corresponding to the major diameter of the screw and the minor diameter of the nut. So the crest diameter will be equal to major diameter.

57. The function of a washer it to \_\_\_\_\_.

- A. provide cushioning effect
- B. provide bearing area
- C. absorb shocks and vibrations
- D. provide smooth surface in place of rough surface

Ans. B

Sol. washer normally used to distribute the load of a threaded fastener, such as a screw or nut.

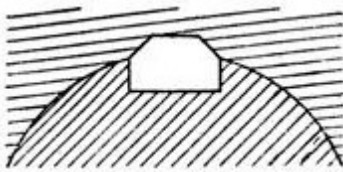
58. The rivet head for general purpose shown in the figure below is:



- A. snap
- B. pan
- C. counter sunk
- D. flat

Ans. C

59. The key shown in the figure below is:



- A. Lewis key
- B. Kennedy key
- C. Pin key
- D. Barth key

Ans. D

Sol shown key is barth key

60. Fibrous fracture occurs in \_\_\_\_\_.

- A. ductile material
- B. brittle material
- C. elastic material
- D. hard material

Ans. A

Sol. A gray and amorphous fracture that results when a metal is sufficiently ductile for the crystals to elongate before fracture occurs. When a fibrous fracture is obtained in an impact test, it may be regarded as definite evidence of toughness of the metal.

61. For tight leakage joints, following type of thread is best suited \_\_\_\_\_.

- A. metric
- B. buttress
- C. NPT (National Pipe Threads)
- D. acme

Ans. C

Sol. NPT (National Pipe Threads) can provide an effective seal for pipes transporting liquids, gases, steam, and hydraulic fluid

62. A backing ring is used inside the pipe joint when making a \_\_\_\_\_.

- A. butt weld
- B. fillet weld
- C. sleeve weld
- D. socket weld

Ans. A

Sol. metal ring used inside a butt-welded joint to reinforce the joint and to prevent weld metal from entering the pipe at the joint

63. Which of the following pipe joints would be suitable for pipes carrying steam?

- A. flanged
- B. threaded
- C. bell and spigot
- D. expansion

Ans. D

Sol. Expansion joint is used in pipe joint that would carrying steam as it will get cool or warm while in running condition.

64. Antifriction bearings are:-

- A. Sleeve bearings
- B. Hydrodynamic bearings
- C. Thin lubricated bearings
- D. Ball and roller bearings

- A. only A
- B. only B and C
- C. only C
- D. None of these

Ans. D

Sol. Antifriction bearings are commonly made with hardened rolling elements (balls and rollers) and races.

65. In V-belt drive, belt touches \_\_\_\_\_.

- A. at bottom
- B. at sides only
- C. both at bottom and sides
- D. could touch anywhere

Ans. B

Sol. For the V belt to be effective, the belt or cable will need to be in contact with the sides of the groove, but not the base of the groove so the friction will be only on the sides.

66. In standard taper roller bearings, the angle of taper of outer raceway is \_\_\_\_\_.

- A. 5°
- B. 8°
- C. 15°
- D. 25°

Ans. D

Sol. In standard taper roller bearings, the angle of taper of outer raceway is 25°

67. Basic shaft is one \_\_\_\_\_.

- A. whose upper deviation is zero
- B. whose lower deviation is zero
- C. whose lower as well as upper deviations are zero
- D. does not exist

Ans. A

Sol. Basic Size: It is the size with reference to which upper or lower limits of size are defined. In case of shaft its upper deviation is zero

68. Allen bolts are \_\_\_\_\_.

- A. self-locking bolts
- B. designed for shock load
- C. used in aircraft application
- D. provided with hexagonal depression in head

Ans. D

Sol. a bolt with a hexagonal socket in its head that is designed to be used with an Allen wrench

69. If the tearing efficiency of a riveted joint is 60%, then ratio of rivet hole diameter to the pitch of rivets is \_\_\_\_\_.

- A. 0.2
- B. 0.33
- C. 0.4
- D. 0.5

Ans. C

Sol. Tearing efficiency of rivet

$$= \frac{(p - d) * t * \sigma}{p * t * \sigma} = 0.6$$

Solving above

$$\frac{d}{p} = 0.33$$

70. A rivet joint may fail due to :-

- A. Shearing of the rivet
- B. Shearing off the plate at an edge
- C. Crushing of the rivet
- A. only A                      B. only B
- C. only C                      D. Any of A or B or C

Ans. D

Sol. Rivet may fail all the above reason stated.

71. The same volume of all gases would represent their \_\_\_\_\_.

- A. densities
- B. specific weights
- C. molecular weights
- D. gas characteristics constants

Ans. C

Sol. The same volume of all gases would represent their molecular weight.

72. Extensive property of a system is one whose value \_\_\_\_\_.

- A. depends on the mass of the system, like volume
- B. does not depend on the mass of the system, like temperature, pressure etc.
- C. is not dependent on the path followed but on the state
- D. is dependent on the path followed and not on the state

Ans. A

Sol. Extensive property of a system is one which depends on the mass of the system, like volume

73. In an isothermal process, the internal energy of gas molecules \_\_\_\_\_.

- A. increases
- B. decreases
- C. remains constant
- D. may increase/decrease depending on the properties of gas

Ans. C

Sol. Internal energy of system is only function of its temperature. In isothermal process temperature does not change and its internal energy remain constant.

74. The more effective way of increasing efficiency of Carnot engine is to \_\_\_\_\_.

- A. increase higher temperature
- B. decrease higher temperature
- C. increase lower temperature
- D. decrease lower temperature

Ans. D

Sol. As the temperature difference increase between the sink the efficiency of cannot engine

will increases. But the upper limit of temperature is limited to material property, hence the only favorable condition is to decrease the lower temperature.

75. Under ideal conditions, isothermal, isobaric, isochoric and adiabatic processes are \_\_\_\_\_.

- A. static processes
- B. dynamic processes
- C. quasi-static processes
- D. stable processes

Ans. C

Sol. Under ideal conditions, isothermal, isobaric, isochoric and adiabatic processes are quasi-static processes

76. Total heat of a substance is also known as \_\_\_\_\_.

- A. internal energy
- B. entropy
- C. thermal capacity
- D. enthalpy

Ans. D

Sol. Total heat of a substance is also known as its enthalpy.

77. In a Carnot cycle, heat is transferred at \_\_\_\_\_.

- A. constant pressure
- B. constant volume
- C. constant temperature
- D. constant enthalpy

Ans. C

Sol. Carnot cycle include

Two isentropic (compression and expansion)

Two isothermal (heat addition and heat rejection)

78. Change of entropy depends upon \_\_\_\_\_.

- A. change of mass
- B. change of temperature
- C. change of specific heats
- D. change of heat

Ans. D

Sol. change in entropy,  $\Delta S = \frac{\Delta Q}{T}$

79. Compressed air coming out from a punctured football \_\_\_\_\_.

- A. becomes hotter
- B. becomes cooler
- C. remains at the same temperature
- D. may become hotter or cooler depending upon the humidity of the surrounding air

Ans. B

Sol.. the gas inside the football will go under free expansion and it will expend on expanse of its internal energy hence its temperature will get cool down.

80. The ratio of actual cycle efficiency to that of ideal cycle efficiency is called \_\_\_\_\_.



- A. effectiveness      B. work ratio  
C. efficiency ratio    D. isentropic efficiency

Ans. C

Sol. ratio of actual cycle efficiency to that of ideal cycle efficiency is called efficiency ratio

81. Which of the following cycles is not a reversible cycle?

- A. Carnot  
B. Ericsson  
C. Stirling  
D. Joule

- A. only A                      B. only A and B  
C. only C                      D. None of these

Ans. D

Sol. The above cycle are reversible cycle.

82. A system will be thermodynamic equilibrium only if it is in \_\_\_\_\_.

- A. Thermal equilibrium  
B. Mechanical equilibrium  
C. Chemical equilibrium

- A. only A                      B. only B  
C. only C                      D. A, B and C

Ans. D

Sol. A system is said to be in equilibrium when system has achieve all the four equilibrium as given below

Thermal equilibrium,  
Mechanical equilibrium,  
Chemical equilibrium

No phase change.

83. Two gases A and B with their molecular weights 28 and 44 respectively, expand at constant pressures through the same temperature range. The ratio of quantity of work done by the two gases (A:B) is \_\_\_\_\_.

- A. 7:11                      B. 11:7  
C. 4:11                      D. 7:4

Ans. B

Sol. The work done by gas is inversely proportional to its molecular mass.

$$\frac{W_A}{W_B} = \frac{M_B}{M_A} = \frac{44}{28} = \frac{11}{7}$$

84. Davis steering gear consists of \_\_\_\_\_.

- A. Sliding pairs              B. Turning pairs  
C. Rolling pairs              D. Higher pairs

Ans. A

Sol. Davis steering system or Davis steering gear is the most used power steering system. Almost all cars are installed with the power steering system. This is a type of side pivot steering mechanism which has only sliding pair system.

85. Properties of substances like pressure, temperature and density, in thermodynamic co-ordinates are \_\_\_\_\_.

- A. path functions    B. point functions  
C. cyclic functions    D. real functions

Ans. B

Sol Properties of substances like pressure, temperature and density are intensive property and independent of mass. Which depend only on state of the system hence these are point function.

86. The refrigeration plants are charged by refrigerants from the cylinder at the \_\_\_\_\_.

- A. suction of compressor  
B. crank case of compressor  
C. evaporator  
D. receiver

Ans. D

Sol. the refrigerant used in the refer plant gets consumed or is reduced in quantity because of leakage in the system. Reduction in quantity of refrigerant may lead to troubles in the plant. When the above mentioned problems occur, it indicates that the plant has to be charged with the refrigerant. charged by refrigerants from the cylinder at the receiver.

87. Which of the following refrigerant characteristics change constantly during the cooling cycle?

- A. pressure and phase  
B. temperature and pressure  
C. phase and flow  
D. flow and pressure

Ans. B

Sol. During cooling cycle in refrigerant system temperature and pressure

88. Moisture in a refrigerant system is removed by \_\_\_\_\_.

- A. Driers  
B. Filter driers  
C. Desiccants  
A. only A                      B. only B  
C. only C                      D. A, B and c

Ans. B

Sol. Moisture in a refrigerant system is removed by filter driers to avoid entry of moisture content in compressor.

89. The most suitable refrigerant for a commercial ice plant is \_\_\_\_\_.

- A. Brine                      B. NH<sub>3</sub>  
C. Freon                      D. Air

Ans. B

Sol. NH<sub>3</sub> has some excellent property like, Penetrating odour, soluble in water.

Harmless in concentration up to 1/30.  
 Non flammable, explosive.  
 Very efficient refrigerant.  
 Attacks copper.  
 Ammonia has excellent environmental credentials, no ODP and no GWP.

90. Fittings in ammonia absorption refrigeration system are made of \_\_\_\_\_.
- A. Cast steel or forgings    B. Copper  
 C. Brass    D. Aluminium

Ans. A  
 Sol. Fittings in ammonia absorption refrigeration system are made of Cast steel or forgings because it attack other metal and corroded it

91. Lithium bromide in vapour absorption refrigeration system is used as \_\_\_\_\_.
- A. refrigerant  
 B. cooling substance  
 C. auxiliary refrigerant  
 D. absorbent

Ans. D  
 Sol. Lithium bromide in vapour absorption refrigeration system is used as absorbent.

92. The condenser and evaporator tubes in a Freon refrigeration plant are made of \_\_\_\_.
- A. steel    B. copper  
 C. brass    D. aluminium

Ans. B  
 Sol. Freon does not have corrosion effect on copper so the component of Freon refrigeration system is made of copper.

93. Vertical lines on pressure-enthalpy chart show constant \_\_\_\_\_.
- A. pressure lines    B. temperature lines  
 C. total heat lines    D. entropy lines

Ans. C  
 Sol. Vertical lines on pressure-enthalpy chart show constant total heat lines.

94. The coefficient of performance is the ratio of the refrigerant effect to the \_\_\_\_\_.
- A. Heat of compression  
 B. Work done by compression  
 C. Enthalpy increase in compressor  
 A. only A    B. only B  
 C. only C    D. A, B and C

Ans. D  

$$COP = \frac{\text{Desire effect}}{\text{work input to the system}}$$
 Work input the system include heat of compression, work done by compression and enthalpy increase in compression.

95. Moisture in Freon refrigeration system causes \_\_\_\_\_.

- A. ineffective refrigeration  
 B. high power consumption  
 C. freezing automatic regulating valve  
 D. corrosion of whole system

Ans. C  
 Sol. Free water can freeze in ice crystals inside the dispenser and in the evaporator tubes systems that operate below the freezing point of water. This reaction is called freeze-up.

96. Efficiency of the Carnot engine is given as 80%. If the cycle direction be reversed, what will be the value of coefficient of performance of reversed Carnot cycle?
- A. 1.25    B. 0.8  
 C. 0.5    D. 0.25

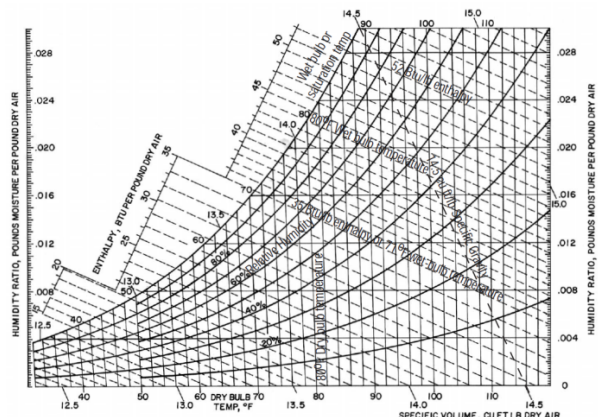
Ans. D  
 Sol.  $COP_{HP} = \frac{1}{n_{carnot}} = \frac{1}{0.80}$   
 $COP_R = COP_{HP} - 1$   
 $COP_R = \frac{1}{0.80} - 1 = \frac{1}{4} = 0.25$

97. During sensible cooling process \_\_\_\_\_.
- A. specific humidity remains constant  
 B. specific humidity increases  
 C. specific humidity decreases  
 D. specific humidity is unpredictable

Ans. A  
 Sol. Sensible heat is the heat (energy) in the air due to the temperature of the air and the latent heat is the heat (energy) in the air due to the moisture of the air. So for sensible cooling no change in moisture content hence specific humidity remain constant.

98. On psychrometric chart, wet bulb temperature lines are \_\_\_\_\_.
- A. horizontal  
 B. vertical  
 C. straight inclined sloping downward to the right  
 D. curved

Ans. C  
 Sol.



In above fig. the wet bulb temperature is shown as dotted line. Which is straight inclined sloping downward to the right

99. If air is heated without changing its moisture content, the dew point will \_\_\_\_\_.
- A. increase                      B. decrease  
C. remain the same      D. unpredictable

Ans. C

Sol. The dew point temperature is the temperature to which the air must be cooled before dew or frost begins to form. The dew point temperature is also a measure of the amount of water vapor in the current air mass. The higher the dew point, the more water vapor there is in the air. knowing the

dew point gives an idea of how moist or dry the air is.

100. Air is normally dehumidified by \_\_\_\_\_.
- A. injecting water      B. passing steam  
C. heating                      D. cooling
- Ans. D

Sol. The process in which the air is cooled sensibly and at the same time the moisture is removed from it is called as cooling and dehumidification process. Cooling and dehumidification process is obtained when the air at the given dry bulb and dew point (DP) temperature is cooled below the dew point temperature

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