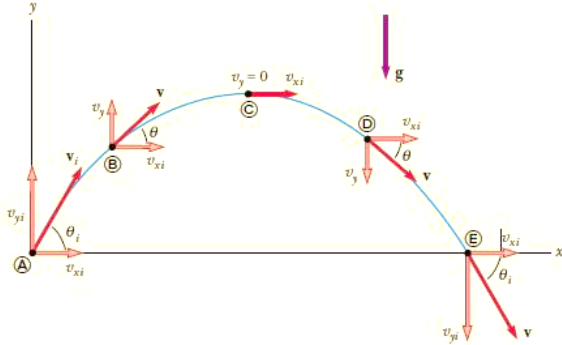


1. A body is thrown up at an angle of  $45^\circ$  with a velocity of 100 m/sec so as to describe a parabola. Its vertical on point of return down will be  
 A. zero                                      B. 130 m/sec  
 C. 50 m/sec                                D. 70.7 m/sec

Ans. D  
 Sol:



from Figure

$$V_{yi} = 100 \sin 45 = 70.7 \text{ m/s} \text{ -----(i)}$$

when body fall on ground in vertical direction,  $s=0$   
 by equation of Motion,

$$V_y^2 = V_{oy}^2 + 2as$$

$$V_y = -V_{oy} = -70.7 \text{ (Because final velocity will be opposite velocity)}$$

so option D is correct

2. When the spring of a watch is wound it posses \_\_\_\_\_.  
 A. heat energy                            B. kinetic energy  
 C. potential energy                      D. wound energy

Ans. C

Sol: in this case, K.E. is Zero and spring of watch is wound then it store some amount of energy and that energy is called potential energy which will be maximum also.

3. When a body falls freely under gravitational force, it possesses \_\_\_\_\_.  
 A. maximum weight                      B. minimum weight  
 C. no weight                                D. No effect on its weight

Ans. C

Sol: This happens because the normal reaction force exerted on the object in the lift is equal to zero, and normal force equals to  $mg$ , which in turn equals the weight of the object.

4. The apparent weight of a man in moving lift is less than his real weight when it is going down with \_\_\_\_\_.  
 A. uniform speed  
 B. an acceleration  
 C. some linear momentum  
 D. retardation

Ans. B

Sol: The weight measured can be defined as the force which the body applies in the downward direction. Or, mathematically, it can be written as

$F = m \cdot a$ ; where  $a$  is directed towards the centre of Earth (downwards).

Now, for a body at rest, the acceleration is the gravitational acceleration ' $g$ '. However, an accelerated body will have some relative acceleration. Considering the downward direction to be positive, we have,

Acceleration due to gravity =  $g$

Downward acceleration inside the lift =  $a$

Therefore, effective acceleration =  $(g - a)$

Total Force in downward direction is given by

$$F = m \cdot (\text{Effective Acceleration}) = m(g - a)$$

$$\text{Or, } F = mg - ma$$

Now, since  $m$  is always positive and  $a$  is positive in downward direction, for a lift moving downwards, we have

$$mg - ma < mg$$

Which means, the apparent weight in a lift moving downwards is always less than the actual weight observed at rest.

5. A body is thrown vertically upwards with a velocity of 980 cm/sec, then the time the body will take to reach the ground will be  
 A. 1 second                                B. 2 seconds  
 C. 2.5 seconds                            D. 4 seconds

Ans. B

Sol: using the free fall case:

$$u = v - gt$$

$$u = 0 \text{ (because it is initial velocity)}$$

$$v = 980 \text{ cm/sec (final velocity)}$$

$$g = 980 \text{ cm}^2/\text{sec}$$

$$v = gt$$

$$t = v/g$$

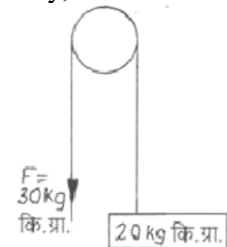
Therefore,

$$t = (980/980) = 1 \text{ sec (time taken to go vertically upward),}$$

same time will take to return back

Now total time taken to reach at ground is  $1+1 = 2$  sec.

6. The figure below shows a weight of 20 kg suspended at one end of cord and force of 30 kg applied at other end of cord passing over a pulley. Neglecting weight of rope and pulley, tension in cord will be



A. 30 kg

B. 20 kg

C. 10 kg

D. 50 kg

Ans. A



15. A ball is thrown up. The sum of kinetic and potential energies will be maximum at  
 A. ground  
 B. highest point  
 C. in the centre while going up  
 D. at all points

Ans. D

Sol: as the ball is thrown upwards its initial velocity is high and its height above the ground is less. As the ball continues to move upward its upward velocity reduces and at the same time its height above the ground increases. At the top most part of its trajectory its velocity is zero and its height is maximum. After this point the ball begins a free fall and its velocity increases and its height reduces. In terms of energy at the beginning the ball has high kinetic energy and no potential energy. As it moves up its kinetic energy gets converted to potential energy. At the peak its kinetic energy is nil and it has the highest potential energy. From now onwards its potential energy begins to be converted to kinetic energy as it falls to the ground. In other words the sum of kinetic energy and the potential energy remain same.

16. Which of the following is not a dimensionless parameter?  
 A. Reynolds number  
 B. friction factor  
 C. pressure coefficient  
 D. kinematic viscosity

Ans. D

Others are the mathematical number whereas kinematic viscosity are properties it is having units (poise) .

17. The specific speed of a pump is defined as the speed of a unit of such a size that  
 A. it delivers unit discharge at unit head.  
 B. it delivers unit discharge at unit power.  
 C. it requires unit power per unit head.  
 D. it produces unit horse power with unit head.

Ans. A

Specific speed ( $N_s$ ) of the pump is defined as the speed of some unit of the series of such size that it delivers unit discharge at unit speed

Specific Speed of Pump is a method of characterizing pumping conditions and it may be used to determine the most appropriate pump design for a given application.

18. The total energy of each particle at various places in the case of perfect incompressible fluid flowing in continuous stream  
 A. keeps on increasing.  
 B. keeps on decreasing.  
 C. remains constant.

- D. may increase or decrease.

Ans. C

Sol: remains constant because of the Bernoulli's equations it state that sum of all energy remains constant at all the points in streamline flow.

19. Pressure intensifier increases the pressure in proportion to \_\_\_\_\_.  
 A. ratio of diameters  
 B. square of ratio of diameters  
 C. inverse ratio of diameters  
 D. square of inverse ratio of diameters

Ans. B

Sol: As the pistons are mechanically linked, their force and stroke length are the same. If the diameters are different, the hydraulic pressure in each cylinder will vary in the same ratio as their areas: the smaller piston giving rise to a higher pressure. As the pressure is inversely proportional to the area, it will be inversely proportional to the square of the diameter.

20. Normal depth in open channel flow is the depth of flow corresponding to  
 A. steady flow                      B. unsteady flow  
 C. laminar flow                      D. uniform flow

Ans. D

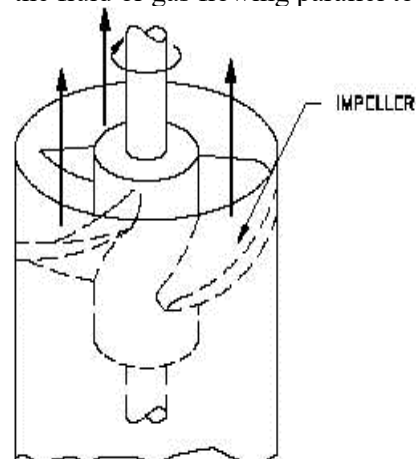
Sol: Normal depth is the depth of flow in a channel or culvert when the slope of the water surface and channel bottom is the same and the water depth remains constant. Normal depth occurs when gravitational force of the water is equal to the friction drag along the culvert and there is no acceleration of flow. In culverts, water flows at normal depth when outside the influence of the inlet and outlet tail water.

so option D is correct

21. Which of the following is not a rotary pump?  
 A. gear                                      B. vane  
 C. screw                                      D. axial

Ans. D

Sol: the fluid or gas flowing parallel to the axis



22. Venturimeter is used to measure flow of fluids in pipes when pipe is  
 A. horizontal  
 B. vertical, flow downwards  
 C. vertical, flow upwards  
 D. in any position

Ans. D

Sol: Venturimeter is flow measurement instruments which use a converging section of pipe to give an increase in the flow velocity and a corresponding pressure drop from which the flow rate can be deduced. They have been in common use for many years, especially in the water supply industry. It use in any position of pipe.

23. Hydraulic accumulator is used for \_\_\_\_\_.  
 A. accumulating oil  
 B. supplying large quantities of oil for very short duration  
 C. generally high pressures to operate hydraulic machines  
 D. supplying energy when main supply fails

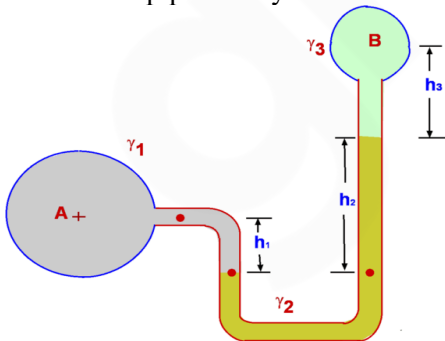
Ans. D

Sol: An accumulator enables a hydraulic system to cope with extremes of demand using a less powerful pump, to respond more quickly to a temporary demand, and to smooth out pulsations. It is a type of energy storage device.

24. Differential monometer is used to measure \_\_\_\_\_.  
 A. pressure in pipes, channels etc.  
 B. atmospheric pressure  
 C. very low pressure  
 D. difference of pressure between two points

Ans. D

Sol: Differential monometer is used to measure difference of pressure between two points. Point lie in the same pipe or may be in different pipe.



25. The total pressure force on a plane area is equal to the area multiplied by the intensity of pressure at the centroid, if  
 A. the area is horizontal  
 B. the area is vertical  
 C. the area is inclined  
 A. only A                      B. only B  
 C. only C                      D. A, B, and C

Ans. D

Sol: total pressure force is only concern about area not about the position of area.

26. A piece weighing 3 kg in air was found to weigh 2.5 kg when submerged in water. Its specific gravity is  
 A. 1                                      B. 5  
 C. 7                                      D. 6

Ans. D

Sol: mass difference = 150-100 = .5 kg (because of Buoyant force of water)

Buoyant Force in water (F<sub>b</sub>) = density of water x g x volume of body (V<sub>b</sub>)

$$.5 = 1000 \times V_b$$

$$V_b = 0.0005 \text{ cubic meter}$$

Now, in air Mass of body, m = 3 Kg

So,

$$\text{Density of body} = m / V_b$$

$$= 3 / .0005$$

$$= 6000 \text{ kg per cubic meter}$$

Specific gravity of body

$$\frac{\text{density of body}}$$

$$= \frac{\text{density of water}}{1000} = 6000 / 1000$$

$$= 6$$

27. The dimensions of coefficient of viscosity are

- A. M<sup>1</sup>L<sup>-1</sup>T<sup>-1</sup>                      B. M<sup>-1</sup>L<sup>1</sup>T<sup>-1</sup>  
 C. M<sup>-1</sup>L<sup>1</sup>T<sup>1</sup>                      D. M<sup>1</sup>L<sup>-1</sup>T<sup>1</sup>

Ans. A

Sol: Mathematically,

Dynamic viscosity = Stress ( Length / velocity).

Dimensional Formula of Stress = M<sup>1</sup>L<sup>-1</sup>T<sup>-2</sup>

Dimensional Formula of Length = M<sup>0</sup>L<sup>1</sup>T<sup>0</sup>

Dimensional Formula of velocity = M<sup>0</sup>L<sup>1</sup>T<sup>-1</sup>

Putting these values in above equation we get,

$$\text{Dynamic viscosity} = M^1 L^{-1} T^{-2} (T^1)$$

$$\text{Dynamic viscosity} = M^1 L^{-1} T^{-1}$$

SI unit of Dynamic viscosity is Kg / ms

28. A liquid compressed in cylinder has a volume of 0.04 m<sup>3</sup> at 50 N/cm<sup>2</sup> and a volume of 0.039 m<sup>3</sup> at 150 N/cm<sup>2</sup>. The bulk modulus of elasticity of liquid is

- A. 400 N/cm<sup>2</sup>                      B. 4000 N/cm<sup>2</sup>  
 C. 40000 N/cm<sup>2</sup>                      D. 40 N/cm<sup>2</sup>

Ans. B

Sol: Bulk modulus :

$$B = -V \left( \frac{P}{V} \right) ; \Delta p = \frac{100N}{cm^2} ; \frac{\partial v}{v} = .0025 m^3$$

$$B = -V \left( \frac{P}{V} \right) = 4000 B / cm^2$$

29. Maximum work is done in compressing air when the compression is \_\_\_\_\_.

- A. isothermal                      B. adiabatic  
 C. polytropic                      D. None of these

Ans. B

Sol: Adiabatic compression in simple terms means that no heat is given to or taken from the cylinder walls of the compressor. Also all work done in



compressing the air is stored in the compressed air itself. Thus this process takes maximum energy input as no heat loss takes place through the cylinder walls. Thus theoretically, the compression process can be represented as  $PV^{\gamma} = C$ .

30. Surface tension \_\_\_\_\_.
- acts in the plane of the interface normal to any line in the surface
  - is also known as capillarity
  - is a function of the curvature of the interface
  - decreases with fall in temperature

Ans. A

Sol: surface tension is defined as force acts in the plane of the interface normal to any line in the surface.

31. In a static fluid \_\_\_\_\_.
- resistance to shear stress is small
  - fluid pressure is small
  - linear deformation is small
  - only normal stresses can exist

Ans. D

Sol: static fluid means the fluid which is not moving or we can say that the fluid on which there is no tangential shear force is acting, it can be termed as static fluid.

32. When a piping system is made up primarily of vertical lift and very little pipe friction, the pump characteristics should be \_\_\_\_\_.
- horizontal
  - nearly horizontal
  - steep
  - first rise and then fall

Ans. C

Sol: When a piping system is made up primarily of vertical lift and very little pipe friction, the pump characteristic should be steep and when a piping system is made up primarily of friction head and very little of vertical lift, the pump characteristic should be near horizontal.

33. A block of ice floating over water in a vessel slowly melts in it. The water level in the vessel will
- start rising
  - start falling
  - will remain constant
  - will depend on temperature of water

Ans. C

Sol: Because when floating, the ice displaces an amount of water equal to its mass, and when melted, it becomes an amount of water equal to its mass. due to this height of rise remains constant.

34. Low specific speed of a pump implies that it is
- centrifugal pump
  - mixed flow pump
  - axial flow pump
  - axial flow pump or mixed flow pump

Ans. A

Sol: Low-specific speed radial flow impellers develop hydraulic head principally through centrifugal force.

35. For pumping viscous oil, which of the flowing pumps will be used?
- Centrifugal pump
  - Reciprocating pump
  - Turbine pump
  - Screw pump

Ans. D

Sol: A screw pump is a positive-displacement (PD) pump that use one or several screws to move fluids or solids along the screw(s) axis Three-spindle screw pumps are used for transport of viscous fluids with lubricating properties. They are suited for a variety of applications such as fuel-injection, oil burners, boosting, hydraulics, fuel, lubrication, circulating, feed and so on.

36. Impulse turbine is used for
- low head
  - high head
  - medium head
  - high flow

Ans. B

Sol: because it have only kinetic energy at the input stage

37. An ideal fluid is
- similar to perfect gas
  - one which obeys Newton's law of viscosity
  - frictionless and incompressible
  - very viscous

Ans. C

Sol: An ideal fluid is a fluid that has several properties including the fact that it is:

- Incompressible – the density is constant
- Irrotational – the flow is smooth, no turbulence
- Nonviscous –(Inviscid) fluid has no internal friction ( $\eta = 0$ )

38. The ratio of power produced by the turbine to the energy actually supplied to the turbine is called \_\_\_\_\_.

- Mechanical efficiency
- Hydraulic efficiency
- Overall efficiency
- Turbine efficiency

Ans. C

Sol: overall efficiency is define as the ratio of power produce by the turbine and the energy input to the turbine

39. Laminar flow occurs in pipes, when Reynolds number \_\_\_\_\_.
- lies between 2000 – 3000
  - lies between 3000 – 4000
  - is more than 2000
  - is less than 2000

Ans. D

Sol: Reynolds number  $< 2100$ , flow is laminar. For Reynolds number  $> 4000$ , flow is turbulent. It is experimentally proved the formula of Reynolds number () or by the die experiments.

40. Reaction turbines are used for \_\_\_\_\_.
- Low head
  - High head
  - High head and low discharge
  - Low head and high discharge

Ans. D

**Sol:** reaction turbines are designed in this way that high amount of discharge can flow from it and we know  $P = \rho g Q H$

If discharge increase than head decrease to maintain same amount of power developed

41. Specific speed of hydraulic turbine is dependent upon \_\_\_\_\_.
- speed, power developed and flow
  - speed, power developed and effective head
  - speed, head and flow
  - speed, mean diameter and head

Ans. B

With the commonest definition N is in rpm, P in kW (note), H in m,

Specific speed (turbine)

$$N_s = \frac{P^{1/2} N}{H^{5/4}}$$

42. The cavitation in reaction type hydraulic turbines is avoided by
- Using highly polished blade
  - Using stainless steel runner
  - Running the turbine at designed speed
  - Installing the turbine below the tail race level
- only A
  - A and B only
  - B and C only
  - A, B, C and D

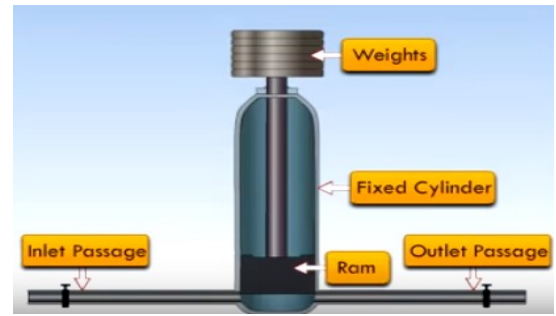
Ans. D

**Sol:** All are the assumption. Hence (D) is correct.

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

Ans. B

**Sol:** hydraulic accumulator is based on conservation of energy. A hydraulic accumulator is a pressure storage reservoir in which a non-compressible hydraulic fluid is held under pressure that is applied by an external source. The external source can be a spring, a raised weight, or a compressed gas.



44. Surface tension of water \_\_\_\_\_.
- increases with decrease in temperature
  - decreases with decrease in temperature
  - independent of temperature
  - None of these

Ans. A

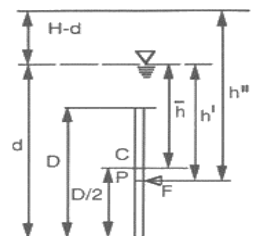
**Sol:** surface tension decreases when temperature increases because cohesive forces decrease with an increase of molecular thermal activity and vice-versa

45. The point in the immersed body through which the resultant pressure of liquid may be taken to act is known as
- centre of gravity
  - centre of buoyancy
  - centre of pressure
  - metacenter

Ans. C

**Sol:** The center of pressure is the point where the total sum of a pressure field acts on a body, causing a force to act through that point.

Fully Submerged



$h'$  is distance between free surface and centre of pressure

46. High speed steel should have
- wear resistance
  - hardness
  - toughness
- only A
  - only B
  - only C
  - Both A and B

Ans. D

**Sol:** High Speed Steel is a cutting tool material used in drilling, milling, turning, threading, boring, broaching, gear cutting and many other machining operations that's why High speed steel should have wear resistance and hardness.

47. 18-4-1 high speed steel contains  
 A. 18% carbon                      B. 4% carbon  
 C. 1% carbon                        D. 0.7% carbon

Ans. D

**Sol:** 18-4-1 HSS i.e. 18% tungsten, 4% chromium, 1% vanadium with a carbon content of 0.6 - 0.7%. If vanadium is 2% it becomes 18-4-2 HSS.

48. Essential gradient of any hardened steel is \_\_\_\_\_.  
 A. Carbon                              B. Cementite  
 C. Martensite                        D. Pearlite

Ans. C

**Sol:** Martensite is formed in carbon steels by the rapid cooling of the austenite form of iron at such a high rate that carbon atoms do not have time to diffuse out of the crystal structure in large enough quantities to form cementite ( $Fe_3C$ ).

49. Steel containing 11% to 14% chromium and 0.35% carbon is called \_\_\_\_\_.  
 A. Martensitic stainless steel  
 B. Ferritic stainless steel  
 C. Austenitic stainless steel  
 D. None of these

Ans. A

**Sol:** **Martensitic:** Chromium-iron alloys with 10.5-17% chromium and carefully controlled carbon content, harden able by quenching (quickly cooled in water or oil) and tempering (heated then cooled). It has magnetic properties. Commonly used in knives. Martensitic grades are strong and hard, but are brittle and difficult to form and weld. Type 420 (S42000) is a typical example.

50. Steel containing 18% chromium and 8% nickel is called \_\_\_\_\_.  
 A. Martensitic stainless steel  
 B. Ferritic stainless steel  
 C. Austenitic stainless steel  
 D. None of these

Ans. C

**Sol:** **Austenitic:** Chromium-nickel-iron alloys with 16-26% chromium, 6-22% nickel (Ni), and low carbon content, with non-magnetic properties (if annealed - working it at low temperatures, then heated and cooled). Nickel increases corrosion resistance. Harden able by cold-working (worked at low temperatures) as well as tempering (heated then cooled). Type 304 (S30400) or "18/8" (18% chromium 8% nickel), is the most commonly used grade or composition.

51. The ultimate strength of steel in tension in comparison to shear is in the ratio of  
 A. 1 : 1                                  B. 2 : 1  
 C. 3 : 2                                  D. 2 : 3

Ans. C

**Sol:** The relationship varies from 0.5 to 0.577, whether you use Tresca or von Mises criterion.

52. Steel containing pearlite and ferrite is \_\_\_\_\_.  
 A. Tough                                B. Hard  
 C. Soft                                    D. Ductile

Ans. C

**Sol:** **Ferrite-** pure steel with very less percentage of carbon ( 0.008% C at room temperature and the rest is Iron).

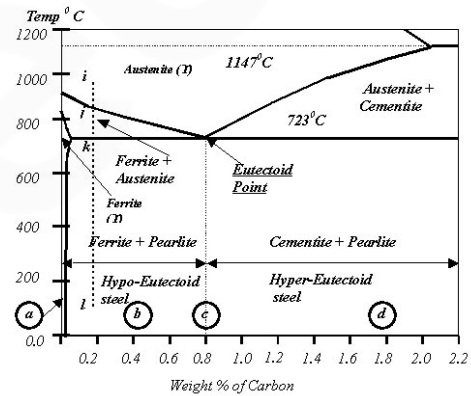
**Pearlite-** It is a microstructure which contains both ferrite and cementite. This microstructure is formed after Eutectoid Reaction at 723°C.

Steel contains both is called soft.

53. Steel with carbon below 0.8% is called \_\_\_\_\_.  
 A. Eutectoid steel                      B. Hypo-eutectoid steel  
 C. Austenite                            D. Hyper-eutectoid steel

Ans. B

**Soln:**



From Iron-Carbon Diagram, option B is correct

54. Fluidity is greatly influenced by  
 A. carbon content of molten metal  
 B. melting temperature of molten metal  
 C. inoculant addition  
 D. pouring temperature of molten metal

Ans. D

**Soln:** Fluidity where the molten metal is made to flow along a channel at room temperature. The distance of metal flow before it solidifies and stops is a measure of its fluidity.

So option D is correct

55. Hardness of steel depends upon amount of \_\_\_\_\_.  
 A. Pearlite                                B. Ferrite  
 C. Cementite                            D. Martensite

Ans. C

**Sol:** Cementite or iron carbide is an intermetallic compound of iron and carbon, more precisely an intermediate transition metal carbide with the formula  $Fe_3C$ . It is a hard, brittle material. Cementite properties increases with increase amount of carbon

56. Which of the following steel key is usually strong in failure by shear and crushing?  
 A. rectangular                      B. flat  
 C. square                              D. circular

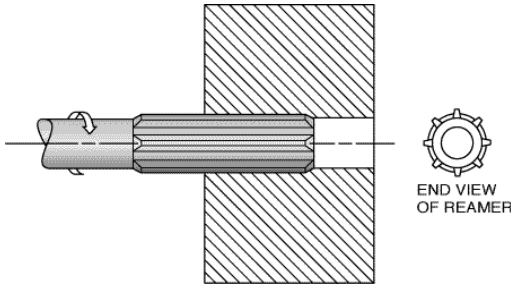
Ans. C

**Sol:** For a square key equally strong in shearing and crushing show that permissible crushing stress is twice the shear stress.  
 Hence (C) is correct.

57. In the flange coupling the two flanges are coupled together by means of bolts fitted in  
 A. reamed holes                      B. machined holes  
 C. threaded holes                    D. gasketed holes

Ans. A

**Sol:** A reamer is a type of rotary cutting tool used in metalworking. Precision reamers are designed to enlarge the size of a previously formed hole by a small amount but with a high degree of accuracy to leave smooth sides.



58. The sleeve or muff coupling is designed as a \_\_\_\_\_.  
 A. thin vessel                          B. thick vessel  
 C. solid shaft                          D. hollow shaft

Ans. D

**Sol:** A sleeve coupling consists of a pipe whose bore is finished to the required tolerance based on the shaft size.



59. Metal to Metal joint is used for applications subjected to \_\_\_\_\_.  
 A. very high pressure  
 B. very high temperature  
 C. very high pressure and temperature  
 D. severe vibrations

Ans. A

**Sol:** For high pressure is use metal of metal joint.  
 Hence (A) is correct.

60. What is the addendum of cycloidal gear tooth?  
 A. cycloid                              B. involute  
 C. epicycloids                        D. hypocycloid

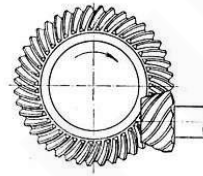
Ans. C

**Sol:** cycloidal gears, the addendum is a curve is an epicycloid.  
 Hence (C) is correct.

61. Which type of gear will be used for non-parallel and non-intersecting shafts?  
 A. helical gears                      B. hypoid gears  
 C. worm gears                        D. herringbone gears

Ans. B

**Sol:** A hypoid gear is a style of spiral bevel gear whose main variance is that the mating gears' axes do not intersect. The hypoid gear is offset from the gear center, allowing unique configurations and a large diameter shaft.



62. Welding units operate at what power factor?  
 A. 0.3                                      B. 0.6  
 C. 0.8                                      D. 0.9

Ans. A

**Sol:** Welding transformer is highly inductive load, having a power factor of below 0.5  
 Hence (A) is correct.

63. Concentric helical springs should be  
 A. wound in the same direction  
 B. wound with opposite hand helices  
 C. could be wound in any direction  
 D. direction of winding depends on the load to be carried

Ans. B

**Soln:** Concentric helical springs consists two or more springs placed inside one another having same axis and wound with opposite hand helices to avoid binding of adjacent coils.

64. In a horizontal flat belt drive, it is customary to use  
 A. bottom side of the belt as the slack side during the transmission of power  
 B. top side of the belt as the slack side  
 C. crossed-beltting  
 D. idler in between

Ans. B

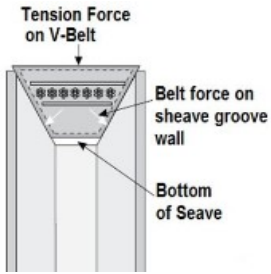
**Sol:** In horizontal flat belt drive Top side of belt is slack side and bottom side is Tight side.  
 Hence (B) is correct.

65. In a V-belt drive, the belt makes contact at \_\_\_\_\_.  
 A. bottom of pulley  
 B. sides of the groove of pulley  
 C. sides of groove and bottom of pulley  
 D. could make contact anywhere

Ans. B



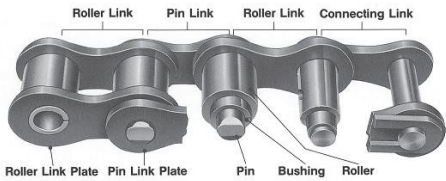
Sol:



66. Which type of chain is used in motor cycle?  
 A. Bush roller                      B. Silent  
 C. Pintle                              D. Ewast

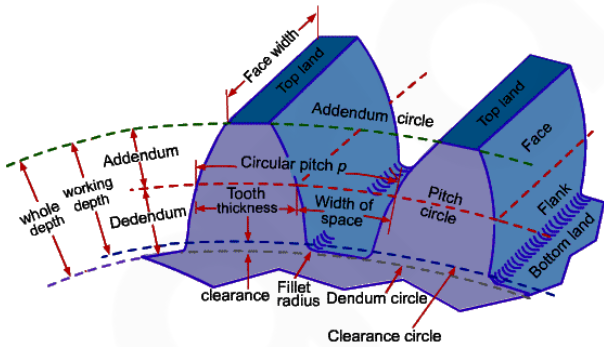
Ans. A

**Sol:** Roller chain or bush roller chain is the type of chain drive most commonly used for transmission of mechanical power on many kinds of domestic, industrial and agricultural machinery, including conveyors, wire- and tube-drawing machines, printing presses, cars, motorcycles, and bicycles.



67. In an involute gear, the base circle must be \_\_\_\_\_.  
 A. at root circle                      B. under root circle  
 C. above root circle                  D. under pitch circle

Ans. B



Dedendum Circle is also called as Root Circle so option B is correct.

68. Gear teeth are made harder to avoid  
 A. greater compressive stress in bending  
 B. tensile strength  
 C. abrasion  
 D. wear

Ans. D

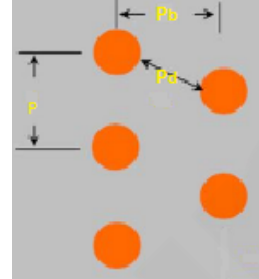
**Sol:** wear is erosion or sideways displacement of material from its "derivative" and original position on a solid surface performed by the action of another surface and hardness is defined as the ability of a material to resist plastic deformation.

69. The distance between the centres of the rivets in adjacent rows of zig-zag riveted joint is known as \_\_\_\_\_.

- A. pitch                                      B. back pitch  
 C. diagonal pitch                          D. diametric pitch

Ans. C

**Sol:**



$P_b$  = back pitch  
 $P_d$  = diagonal pitch  
 $P$  = pitch

70. The safe twisting moment for a compound shaft is equal to the \_\_\_\_\_.

- A. maximum calculated value  
 B. minimum calculated value  
 C. mean value  
 D. extreme value

Ans. B

**Sol:** twisting moment for a compound shaft is equal to the minimum calculated value. Hence (B) is correct.

71. What is the usual quantity of free air taken per person in air conditioning system?

- A. 1.2 m<sup>3</sup>/sec                              B. 1.2 m<sup>3</sup>/min  
 C. 1.2 m<sup>3</sup>/hour                            D. 6 m<sup>3</sup>/min

Ans. C

**Sol:** ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) is an organization devoted to the advancement of indoor-environment-control technology in the heating, ventilation, and air conditioning (HVAC) industry which recommends 1.2 m<sup>3</sup>/hour

72. The total emissivity power is defined as the total amount of radiation emitted by a black body per unit

- A. temperature                              B. thickness  
 C. area    D. time

Ans. D

**Sol:** unit of emissivity is joules/second

73. Sensible heat is the heat needed to  
 A. vaporize water into steam and vice versa  
 B. Change the temperature of a liquid or vapour  
 C. convert water into steam and superheat it  
 D. measure dew point temperature

Ans. B

**Sol:** Sensible heat is related to changes in temperature of a gas or object with no change in phase.

Hence (B) is correct.

74. The difference between dry bulb and wet bulb temperature increases as \_\_\_\_\_.

- A. air becomes wetter
- B. air becomes drier
- C. atmospheric temperature rises
- D. atmospheric temperature decreases

Ans. B

**Sol:** dryness of air increase the dry bulb temperature.

75. The weight of the water vapour in kg contained in 1 m<sup>3</sup> of air-vapour mixture at its total pressure is known as \_\_\_\_\_.

- A. degree of saturation
- B. percent humidity
- C. humidity ratio
- D. vapour density

Ans. D

**Sol:** Vapour density is defined as weight of the water vapour in kg contained in 1 m<sup>3</sup> of air-vapour mixture at its total pressure.

Hence (D) is correct.

76. Dehumidification is the process of removing moisture from air with dry bulb temperature \_\_\_\_\_.

- A. increasing
- B. decreasing
- C. remaining constant
- D. changing any direction

Ans. C

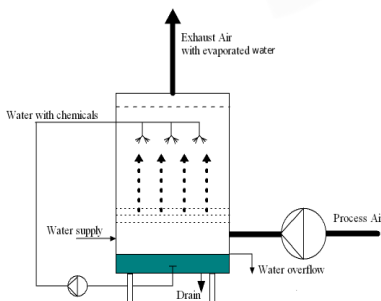
**Sol:** there is no any relation between Dehumidification and dry bulb temperature.

77. Spray humidifying is the process of adding moisture to the air by passing it through

- A. Chiller
- B. Air Conditioning Plant
- C. Washers
- A. only A
- B. only B
- C. only C
- D. A or B

Ans. C

**Sol:**



78. Dew point is \_\_\_\_\_.

- A. the temperature at which condensation of steam in saturated air will start
- B. the lowest attainable temperature for a mixture of air and steam
- C. dependent on pressure of air
- D. used in connection with air conditioning

Ans. A

**Sol:** If sensible heat is removed from the air, the air temperature will drop. When the air becomes saturated (100% relative humidity), the number of molecules condensing will be in equilibrium with the number evaporating and the temperature will be at the Dew point temperature.

79. Relative humidity is

- A. something concerned with air conditioning
- B. the ratio of moisture present in air to the capability of air to hold maximum moisture
- C. the ratio of actual humidity to absolute humidity
- D. representative of amount of moisture held in air

Ans. B

**Sol:** Relative humidity ( $\phi$ ) is the ratio of the partial pressure of water vapor to the equilibrium vapor pressure of water at a given temperature.

$$\phi = P_{\text{water}} / P_{\text{water}}^*$$

80. Cryogenics refers to

- A. refrigeration at low temperature
- B. thermodynamic analysis at low temperature
- C. engineering field concerned with equipment in the range of -180°C to absolute zero
- D. Refrigeration under vacuum conditions

Ans. C

**Sol:** cryogenics is the study of the production and behaviour of materials at very low temperatures.

81. Which of the following refrigerating plants requires no electricity?

- A. vapour absorption
- B. vapour compression
- C. air-refrigeration
- D. vortex tube

Ans. A

**Sol:** An absorption refrigerator is a refrigerator that uses a heat source like solar energy, a fossil-fueled flame, waste heat from factories, or district heating systems to provide the energy needed to drive the cooling process.

82. A hermetically sealed unit implies \_\_\_\_\_.

- A. compressor is sealed
- B. compressor motor is sealed
- C. refrigerant cycle sealed
- D. compressor and motor are sealed

Ans. D

**Sol:** This makes the whole compressor and the motor a single compact and portable unit that can be handled easily.

Hence (D) is correct.

83. The work required for compression in a closed system increases when the value of 'n' (the index of compression) \_\_\_\_\_.

- A. increases
- B. decreases
- C. remain the same
- D. first increases and then decreases

Ans. A

**Sol:**  $W = PV^n$

Where

W-work

P-pressure

V-volume

W is directly proportional to  $V^n$  hence

IF n is increase then work is also increase.

Hence (A) is correct.

84. The value of entropy at 0°C is taken as

- A. 1
- B. 0
- C. -1
- D. 0.5

Ans. B

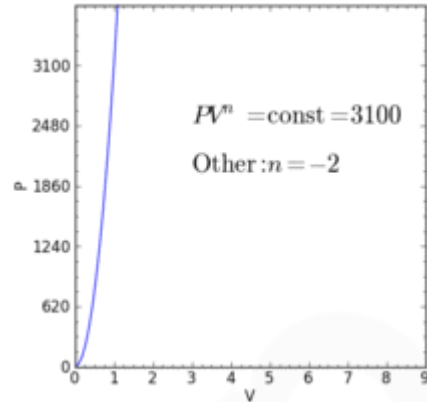
**Sol:** The value of entropy of water at 0°C as zero is just taken as a reference. This is because, for calculations (in property relations), we are mainly concerned with the difference in the entropies rather than its absolute value.

85. On a pressure volume diagram, the process line  $PV^n = C$  (as the value of 'n' increases) will \_\_\_\_\_.

- A. come closer to y-axis
- B. come closer to x-axis
- C. come closer to 45° inclined line
- D. remain in the same position

Ans. A

**Sol:**



Hence (A) is correct.

86. Calorie is measure of \_\_\_\_\_.

- A. Specific heat
- B. Quantity of heat
- C. Thermal capacity
- D. Entropy

Ans. B

**Sol:** A calorie is a unit of energy (or heat). it is defined as the approximate amount of energy needed to raise the temperature of one gram of water by one degree Celsius at a pressure of one atmosphere.

1calorie = 4.184joule

87. Kelvin Plank's law deals with the \_\_\_\_\_.

- A. conservation of heat
- B. conservation of work
- C. conversion of heat into work
- D. conservation of work into heat

Ans. C

**Sol:** Kelvin–Planck state that it is impossible to devise a cyclically operating device, the sole effect of which is to absorb energy in the form of heat from a single thermal reservoir and to deliver an equivalent amount of work.

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