MEGA MOCK CHALLENGE

BYJU'S EXAM PREP

NHPC JE

Mechanical Engineering

Mega Mock Test

(April 03rd - April 04th 2022)

Questions & Solutions

1. Elastic limit is the point _____

A. up to which stress is proportional to strain

B. At which elongation takes place without application of additional load

C. Up to which if the load is removed, original volume and shapes are regained

D. None of the mentioned

Ans. C

Sol. The elastic limit is that limit up to which any material behaves like an elastic material.

2. The expression for the ratio of the heights of Porter governor of equal length of arms and links, to the height of a Watt governor is:

A. $\frac{M}{m+M}$

B. $\frac{m}{m+M}$

C. $\frac{m+M}{m}$

D. $\frac{m+M}{M}$

Ans. C

Sol. Height of a Porter governor of equal link and arm length is:

$$h_{porter} = \frac{895}{N^2}\frac{(M+m)}{m}$$

Height of a Watt governor is:

$$h_{watt} = \frac{895}{N^2}$$

Thus:

$$\frac{h_{porter}}{h_{watt}} = \frac{m+M}{m}$$

3. In ultrasonic machining, the material removal rate changes with abrasive size as

A. First increases then decreases

B. Increases

C. Decreases

D. Constant

Ans. A

Sol. By increasing the size of the abrasive grains ,the material removal rate increase.But when the size increases beyond a certain value due to mutual drag between abrasive grains the material removal rate decreases.

4. The Octane rating of LPG is _____.

A. 81

B. 95

C. 110

D. 150

Ans. C

Sol. • Octane rating of Petrol is 81.

• Octane rating of LPG is 110.

5. The path of contact of two gears in a mesh is 50 mm and the pressure angle is 45°. The module is 8 mm. Find the contact ratio of these two gears.

A. 4.2

B. 1.9

C. 3.7

D. 2.8

Ans. D

Sol. Arc of contact = Path of contact/cos φ = 50/cos 45° = 70.71 mm

Contact ratio = Arc of contact/ Circular pitch = Arc of contact / πm = 70.71/(πx8) = 2.8.

6. Maximum shear stress in a Mohr's circle is

A. Equal to radius of Mohr's circle

B. Greater than radius of Mohr's circle

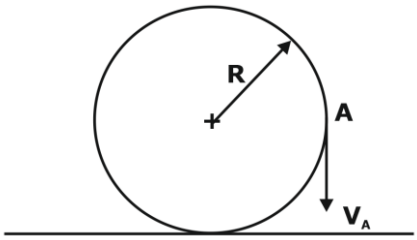
C. Less than the radius of Mohr's circle

D. None of these

Ans. A

Sol. Maximum shear stress in a Mohr's circle is equal to the radius of Mohr's circle.

7. In case of a rolling motion, as shown in the figure, the velocity of point A will be (Consider the rotational velocity as ω rad/s)



A. $V_A = R\omega$

B. $V_A = 2R\omega$

C. $V_A = \sqrt{2}R\omega$

D. $V_A = R\omega/\sqrt{2}$

Ans. C

Sol. Velocity of point A = Distance of A from I-centre × angular velocity = $\sqrt{2}R\omega$

8. Laminar flow in pipe, the maximum velocity is found to be 60 cm/sec. The average velocity of the flow (in cm/sec) is_____.

A. 40

B. 60

C. 30

D. 20

Ans. C

Sol. Given,

Maximum velocity =60 cm/sec,

Average velocity=?

In case of pipe,

$U_{max.} = 2\ U_{avg.}$

$60 = 2\ U_{avg.}$

$U_{avg.} = 30$ cm/s

9. A frame structure is perfect if it contains members equal to _____.

where n is no. of joints

A. n-1

B. 2n-3

C. 2n-1

D. 2n+1

Ans. B

Sol. A framed structure with m links and j joints:

- If m = 2j – 3, then the frame is perfect frame.
- If m < 2j – 3, then the frame is deficient frame.
- If m > 2j – 3, then the frame is redundant frame.

10. The moment diagram for a cantilever beam subjected to bending moment at end of the beam will be

A. Rectangle
B. Triangle
C. Parabola
D. Elliptical

Ans. A

Sol. Since the bending moment is acting at the end of cantilever beam, the bending moment will be constant throughout the beam.

11. A condenser where circulating water flows through tubes which are surrounded by steam is known as

A. Surface condenser
B. Jet condenser
C. Barometric condenser
D. Evaporative condenser

Ans. A

Sol. A condenser where circulating water flows through tubes which are surrounded by steam is known as surface condenser.

In the surface condenser, the steam to be condensed is usually passed over a large number of tubes through which cooling water is passing.

The steam is condensed on the surface of the tubes as it gives up its enthalpy to the cooling water passing through the tubes. The condensed and cooling water leave separately.They are also called Indirect condenser.

12. Which of these is an approximate straight line motion mechanism?

A. Scott Russell's mechanism
B. Hart's mechanism
C. Peaucellier mechanism
D. Watt's mechanism

Ans. D

Sol. Watt's consists of three links. Two of them are of equal length whereas one is shorter. Due to the rotation motion of the longer links, the centre of the shorter link traces an approximate straight line. Out of the following mechanism, Watt's mechanism is an approximate straight line mechanism whereas the rest are exact straight line mechanisms.

13. A single stage impulse steam turbine has blade efficiency of 80% and stage efficiency is 65%. Find nozzle efficiency of steam turbine_____?

A. 52%
B. 81.25%
C. 133.33%
D. 76%

Ans. B

Sol. Given,

For a single stage impulse steam turbine,

Blade efficiency = 80%

Stage efficiency = 65%

η_s = stage efficiency [η_n = Nozzle efficiency]

η_b = blade efficiency

η_b = blade efficiency

$0.65 = 0.8 \times$ nozzle efficiency

Nozzle efficiency $= 0.8125 = 81.25\%$

14. To avoid cavitation in centrifugal pumps _____.

A. suction pressure should be low

B. delivery pressure should be low

C. suction pressure should be high

D. delivery pressure should be high

Ans. C

Sol. Cavitation start where the pressure is low

From its vapor pressure and in pump low pressure is formed in only suction side.

15. Parting tool and broaching tool are respectively

A. Single point cutting tool and multi point cutting tool

B. Multi point cutting tool and single point cutting tool

C. Both are double point cutting tool

D. None of these

Ans. A

Sol. Parting tool has single edge for cutting while broaching tool has many teeth for cutting purpose.

16. In boilers, the feedwater treatment is done mainly for prevention of _____.

A. Scale formation.

B. Corrosion

C. Embrittlement

D. All of above.

Ans. D

Sol. Scale is a hard or soft deposit on the internal surfaces of boiler. Due to this, heat transmission through heating surface is reduced. Corrosion is either due to water alkalinity or pressure. It produces pits or cracks. Embrittlement results from non-uniform corrosion leading to accelerated cracks in edges of plates. Hence to prevent all these precautions must be taken to treat water before using it.

17. In an iceberg, 15% of the volume projects above the sea surface. If the specific weight of sea water is 10.5 kN/m^3, the specific weight of iceberg in kN/m^3 is?

A. 12.52

B. 9.81

C. 8.93

D. 7.83

Ans. C

Sol. For floating bodies

Weight of body = Buoyancy force

$\gamma_{ice} \times$ volume of iceberg = $\gamma_{sea\ water} \times (0.85) \times$ volume of iceberg

$\gamma_{ice} = 0.85 \times 10.5$

$\gamma_{ice} = 8.925\ kN/m^3$

18. As discharge of 90 l/s is obtained from a centrifugal pump which has 20 m/s tangential velocity at outlets against a net head of 15 m if manometric efficiency of pump is 80% of the approximate velocity of whirl at outlet of pump _____.

A. 7 m/s
B. 9 m/s
C. 11 m/s
D. 13 m/s

Ans. B

Sol. Manometric efficiency is given by:

$$\eta_m = \frac{gH_m}{V_{w_2}U_2}$$

$$\therefore V_{w_2} = \frac{9.81 \times 15}{0.8 \times 20}\ m/s$$

$$\boxed{V_{w_2} \simeq 9.2\ m/s}$$

19. A journal bearing having Diameter clearance to diameter ratio of $\frac{1}{1000}$, using a lubricant with viscosity is 0.03 Pas. Supports the shaft journal running at N is 3000 rpm. If bearing pressure is 3 MPa, The Sommerfeld number is,

A. 0.5
B. 0.3
C. 0.2
D. 0.1

Ans. A

Sol. Given,

Z = 0.03 PaS,

N = 3000 rpm,

$$n = \frac{3000}{60} = 50\ r.p.m$$

P= 3 x 10^6 Pa

Diameter clearance to diameter ratio of = $\frac{1}{1000}$

Somerfield number is,

$$S = \left(\frac{d}{c}\right)^2 \left(\frac{Zn}{p}\right)$$

$$= (1000)^2 \left(\frac{0.03 \times 50}{3 \times 10^6}\right)$$

S = 0.5

then the sommerfield number of this bearing is 0.5

20. Bernoulli's equation $\frac{P}{\rho g} + \frac{V^2}{2g} + Z$ represents:

A. Total energy per unit mass
B. Total energy per unit volume
C. Total energy per unit weight
D. Total energy per unit flow area

Ans. C

Sol. The expression $\frac{P}{\rho g}+\frac{V^2}{2g}+Z$, has units of energy per unit weight.

21. The neutral axis in a beam is subjected to which type of bending stress?

A. zero
B. minimum
C. maximum
D. infinite

Ans. A

Sol. The neutral axis is the axis through a beam where the stress is zero, that is there is neither compression nor tension.

22. The velocity of sound in the gas flowing through a duct having temperature 127°C, ratio of specific heat 1.5 and gas constant $R = 0.28\frac{kJ}{Kg-K}$ is

A. $409\frac{m}{s}$
B. $460\frac{m}{s}$
C. $370\frac{m}{s}$
D. $335\frac{m}{s}$

Ans. A

Sol. Given,

gas flowing through a duct having temperature T = 127°C = 400K

Ratio of specific heat γ = 1.5,

gas constant = $R = 0.28\frac{kJ}{Kg-K}$

$V = \sqrt{\gamma RT}$,

$R = \frac{0.28kJ}{kg-K} = 280\frac{J}{kg-K}$

$V = \sqrt{1.5\times 280\times 400}$

V = 409.87 m/s

23. The Roots blower and vane-type compressor are the types of

A. displacement compressor
B. steady-flow compressor
C. both of the mentioned
D. none of the mentioned

Ans. A

Sol. These are the two types of rotary positive displacement machines.

Rotary compressors compresses gas to high pressure due to decrease in volume of gas (more specifically due to push and pull of gas or squeezing action of the gas) by the rotary movement of a single rotor or multiple rotors.

24. The following type of gauge has gauging sections combined on one end _____.

A. progressive gauge
B. fixed gauge
C. limit gauge
D. combination gauge

Ans. A

Sol. In a progressive gauge both the GO and NO GO diameters are stepped on a single gauge member.

25. Which of the following statements is true for an isentropic process?

A. Heat transfer is zero

B. Heat transfer may or may not be zero

C. Isentropic is always reversible adiabatic

D. Internal reversibility is always zero

Ans. B

Sol. An isentropic process is the process in which the entropy remains same.In reversible adiabatic process , since the process is reversible hence no entropy generation due to irreversibilty and also since no heat transfer is there, hence no entropy tranfer also.Thus an reversible adiabatic process is isentropic.But if in a irreversible process if the entropy generated due to heat transfer cancels out by entropy reduction due to heat tranfer , this process also becomes isentropic but was not adiabatic.Hence in isentropic process heat may or may not transfer and a reversible adiabatic process is isentropic, but an isentropic (if irreversible) process is not adiabatic.Hence depends on whether process is irreversible or reversible, in isentropic process heat may or may not be transfer.

26. Determine final pressure in vessels after the valve is opened to attain equilibrium for two cylindrical vessels of 3.5 m^3 each are inter connected through a pipe with valve in-between. Initially valve is closed and one vessel has 25 kg air while 5 kg of air is there in second vessel. Assuming the system to be at 27 ºC temperature initially and perfectly insulated, take R = 287 J/kg K for air.

A. 676.8 kPa

B. 596.1 kPa

C. 516.6 kPa

D. 369.0 kPa

Ans. D

Sol. When the valve is opened then the two vessels shall be connected through pipe and transfer of air shall take place in order to attain equilibrium state. After attainment of equilibrium total mass of air shall be 24 kg.

Final total volume = 3.5 + 3.5 = 7 m^3

Using perfect gas equation:

$pV = mRT$

$p = (mRT)/V$

For air, R = 287 J/kg K

Substituting values, $p = (30\times287\times300)/7$

$= 369000\ N/m^2$

Final pressure = 369.00 kPa *Ans*

27. A perpetual motion machine of the first kind i.e. a machine which produces power without consuming any energy is _____.

A. Possible according to first law of thermodynamics

B. Impossible according to first law of thermodynamics

C. Impossible according to second law of thermodynamics

D. Possible according to second law of thermodynamics

Ans. B

Sol. A perpetual motion machine is a hypothetical machine that can do work indefinitely without an energy source. This kind of machine is impossible, as it would violate the first law of thermodynamics.

Hence (B) is correct.

C is not correct because Second law of thermodynamics PMM2 says that it is impossible for a device working in a cycle that develops work by exchanging heat with a single heat reservoir.

And in the question PMM1 is given which says that it is impossible for a device to develop work continuously without any energy input.

28. Minimum shear strain in orthogonal turning with a cutting tool of zero rake angle is_____.

A. 0.0 B. 0.5

C. 1.0 D. 2.0

Ans. D

Sol. Rake angle=0. Therefore shear strain= $\tan(\theta-\beta)+\cot(\theta)$,

where β=rake angle and θ=shear angle

By putting $\beta = 0^\circ$ and differentiating, we get $\theta = \pi/4$, therefore, shear strain=2

29. Which of the following is used as an anti-knocking material?

A. Glyoxal B. Freon

C. T.E .L. D. Ethyl alcohol

Ans. C

Sol. T.E.L. is tetraethyl lead which is used as anti knocking additive for petrol (C_2H_5) 4Pb - T.E.L.

30. Which of the following is correct regarding slip plane _____?

A. The slip plane is the plane of highest atomic density

B. The slip plane is the plane of lowest atomic density

C. There is no dependency of slip plane on atomic density

D. None of the above

Ans. A

Sol.

- The slip plane is the plane that has the most dense atomic packing (the greatest planar density) and the slip direction is most closely packed with atoms (highest linear density).
- The slip planes and directions are characteristic of the crystal structure of materials.
- The slip planes and directions, combined is called the slip systems.

31. The most commonly flux used in soldering process is

A. ammonia chloride B. borax acid

C. boric acid D. slag

Ans. A

Sol. Common fluxes are: ammonium chloride or rosin for soldering tin; hydrochloric acid and zinc chloride for soldering galvanizediron (and other zinc surfaces); and borax for brazing, braze-welding ferrous metals, and forge welding.

32. Which of the following refrigerant is commonly used in domestic refrigerator?

A. Ammonia
B. Carbon-dioxide
C. Air
D. Freon-12

Ans. D

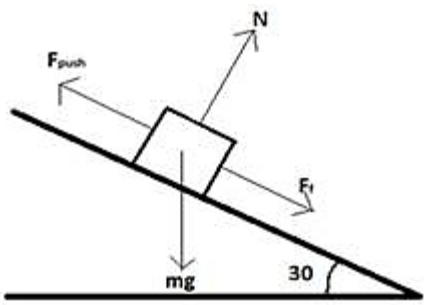
Sol. R-12 is a highly versatile refrigerant that is used for wide range of refrigeration and air conditioning applications though in many air conditioning applications it is now replaced by R22 refrigerant. Refrigerant R12 is used in domestic refrigerators and freezers, liquid chillers, dehumidifiers, ice makers, water coolers, water fountains and transport refrigeration. The wide range of applications of the refrigerant is due to its safe properties.

33. There is a refrigerator's box which has a mass of 100 kg, and the ramp has an angle of 30°. The force needed to get the box moving up the ramp if the coefficient of static friction is 0.20.

A. 609.54 N
B. 633.64 N
C. 659.74 N
D. 712.93 N

Ans. C

Sol.



The force needed to get the box moving up the ramp, F_{push}

$$F_{push} = F_f + mg\sin\theta$$

$$= \mu_s N + mg\sin\theta$$

$$= \mu_s mg\cos\theta + mg\sin\theta$$

$$= mg(\mu_s\cos\theta + \sin\theta)$$

$$= 100 \times 9.8(0.2\cos 30^\circ + \sin 30^\circ) = 659.74\ N$$

34. Which of the following statements are TRUE?

1) Evaporative cooling systems are attractive for hot and humid climates
2) Evaporative cooling systems are attractive for hot and dry climates
3) Evaporative cooling systems are ideal for comfort applications
4) Evaporative cooling systems are ideal for several industrial applications

A. 1 & 2
B. 2 & 3
C. 3 & 4
D. 2 & 4

Ans. D

Sol. Evaporative cooling has been in use for many centuries in countries such as India for cooling water and for providing thermal comfort in hot and dry regions. This system is based on the principle that when moist but unsaturated air comes in contact with a wetted surface whose temperature is higher than the dew point temperature of air, some water from the wetted surface evaporates into air.

Evaporative air conditioning systems can also be used over a broader range of outdoor conditions in factories, industries and commercial buildings, where the comfort criteria is not so rigid (temperatures as high as 30oC in the conditioned space are acceptable). Evaporative air conditioning systems are highly suitable in applications requiring large amounts of ventilation and/or high humidity in the conditioned space such as textile mills, foundries, dry cleaning plants etc

35. The equation of shear stress in beam is given by

Where,

τ=shear stress developed at a fibre on the cross section of beam

P=shear force acting on the cross section of a beam

A=area of hatched portion of the cross section of beam

Y=distance of centroid of hatched portion from neutral axis

I= Moment of inertia of the cross section of beam about neutral axis

b=width of the fibre where τ is to be determined

A. $\tau = P\left[\frac{AY}{Ib}\right]$

B. $\tau = P\left[\frac{Ab}{IY}\right]$

C. $\tau = P\left[\frac{AY^2}{Ib}\right]$

D. $\tau = P\left[\frac{AY}{I}\right]$

Ans. A

Sol. Shear stress in beams is given by

$$\tau = P\left[\frac{AY}{Ib}\right]$$

36. Which of the following formula holds TRUE for dryness fraction _____, where m_v and m_l are mass of vapour and liquid respectively?

A. $\frac{m_v}{m_v+m_l}$

B. $\frac{m_l}{m_v+m_l}$

C. $\frac{m_v+m_l}{m_v}$

D. $\frac{m_v+m_l}{m_l}$

Ans. A

Sol. Dryness fraction (X) is the ratio of mass of vapour to total mass of mixture, When we say mixture' it defines the mixture of liquid and vapour.

$$x = \frac{m_v}{m_v+m_l}$$

m_v and m_l are mass of vapour and liquid respectively.

37. A 5 mm thick metal sheet is to be bent at an angle of 120° with a bend radius of 100 mm. If the stretch factor is 0.6, the bend allowance is (take π =3 radians).

A. 100mm
B. 103 mm
C. 200 mm
D. 206 mm

Ans. D

Sol. The bend allowance is given by:

$K_b = \alpha(R + kt)$

Where,

α = angle made of bend

R= Bend radius

k = stretch factor

t = plate Thickness

As the angle traversed is 2π/3=2 radian

k = 0.6 , R=100 mm and t=5 mm

Thus, $L_b = 2 \times (100 + 0.6 \times 5) = 206$ mm

38. A compound pipe in series of diameter d_1, d_2, and d_3 having lengths l_1, l_2, and l_3 is to be replaced by an equivalent pipe of diameter d and length l, the size of the equivalent pipe is given by

A. $\frac{l}{d^2} = \frac{l_1}{d_1^2} + \frac{l_2}{d_2^2} + \frac{l_3}{d_3^2}$

B. $\frac{l}{d^3} = \frac{l_1}{d_1^3} + \frac{l_2}{d_2^3} + \frac{l_3}{d_3^3}$

C. $\frac{l}{d^4} = \frac{l_1}{d_1^4} + \frac{l_2}{d_2^4} + \frac{l_3}{d_3^4}$

D. $\frac{l}{d^5} = \frac{l_1}{d_1^5} + \frac{l_2}{d_2^5} + \frac{l_3}{d_3^5}$

Ans. D

Sol. For compound pipe in series,

$$Total\ head\ loss, h_L = h_{L1} + h_{L2} + h_{L3}$$

$$\frac{f \cdot l \cdot Q^2}{12d^5} = \frac{f \cdot l_1 \cdot Q^2}{12d_1^5} + \frac{f \cdot l_2 \cdot Q^2}{12d_2^5} + \frac{f \cdot l_3 \cdot Q^2}{12d_3^5}$$

$$\frac{l}{d^5} = \frac{l_1}{d_1^5} + \frac{l_2}{d_2^5} + \frac{l_3}{d_3^5}$$

39. Enthalpy is calculated as the

A. sum of internal energy and the product of pressure and volume of the system

B. sum of internal energy and the product of pressure and density of the system

C. difference between the internal energy and the product of pressure and density of the system

D. difference between the internal energy and the product of pressure and volume of the system

Ans. A

Sol. Hess's Law states that the heat transferred, or change in enthalpy (H), in a reaction is the same regardless whether the reaction occurs in a single step or in several steps. The method of calculating the enthalpy of reaction developed by Hess is called Hess's Law of Heat Summation.

Enthalpy (H) - The sum of the internal energy of the system plus the product of the

pressure of the gas in the system and its volume:

$H_{sys} = E_{sys} + PV$

After a series of rearrangements, and if pressure if kept constant, we can arrive at the following equation:

$$\Delta H = q \ (at\ constant\ pressure)$$

Where ΔH is the H_{final} minus $H_{initial}$ and q is the heat.

40. Torque transmitted by a hollow shaft of the same cross-section area and material as that of a solid shaft, will be_____.

A. Same
B. Less
C. More
D. Cannot be predicted

Ans. C

Sol. Given

Cross-section area is same,

$$\frac{\pi}{4}\left(d_1^2 - d_2^2\right) = \frac{\pi}{4} d_s^2$$

$$\left(d_1^2 - d_2^2\right) = d_s^2$$

$$d_1^2 = d_s^2 + d_2^2$$

So $d_1 > d_s$

where d_1 = outer dia. of hollow shaft

d_2 = inner dia. of hollow shaft

d_s = solid shaft dia.

For given material $T \alpha \frac{J}{r}$

$$\frac{T_H}{T_S} = \frac{\left(\frac{J}{r}\right)_H}{\left(\frac{J}{r}\right)_S}$$

$$= \frac{\left[\frac{d_1^4 - d_2^4}{d_1}\right]}{d_s^3}$$

Since $d_1^2 - d_2^2 = d_s^2$

$$\frac{T_H}{T_S} = \frac{d_1^2 + d_2^2}{d_s\, d_1}$$

So $T_H > T_S$

41. A rankine cycle with temperature limits 400K and 1200K employs a turbine which produces a net-work of 1300kJ/kg and the pump consumes a work of 15kJ/kg. What is the second law efficiency for this power plant if heat addition is 2600kJ/kg?

A. 59.8% B. 64.2%

C. 74.1% D. 69.4%

Ans. C

Sol. Rankine cycle efficiency = Net work/ Heat added

Net-work = Turbine work – Pump work

= 1300 – 15 = 1285kJ/kg

Efficiency = 1285/2600

Carnot efficiency between the same temperature limits = 1 – (400/1200)

= 2/3

Second law efficiency = Rankine efficiency/ Carnot efficiency

$$= \frac{1285\ X\ 3}{2600\ X\ 2} = 0.7413$$

= 74.13%

42. A Screw will be self-locking, if its efficiency is

A. Less than 50% B. more than 50%

C. equal to 50% D. none of these

Ans. A

Sol. By definition, If Screw has less then 50% efficiency, it is said to be self locking, else it is known as over-hauling screw.

43. 100 MPa (Tensile) and 50 MPa (Compressive) are the principle stress acting at point on the component. The maximum shear stress τ_{max} (in MPa) is _____.

A. 25 B. 150

C. 75 D. 50

Ans. C

Sol. Given

σ_1=100 MPa

σ_1=-50 MPa

The maximum shear stress is given by

$$\tau_{max} = \frac{\sigma_1 - \sigma_2}{2}$$

$$\tau_{max} = \frac{100 - (-50)}{2} = 75\ MPa$$

44. The stress represented by 'sin (t)+1" belongs to which category?

A. Fluctuating Stresses B. Alternating stresses

C. Repeated Stresses D. Reversed Stresses

Ans. C

Sol. As we know that, value of sin(t) varies from -1 to +1

so

sint + 1 will vary from 0 to 2 (-1+1 to 1+1)

so,

The minimum stress value is zero and hence is belongs to Repeated Stress category.

45. Velocity of sliding at the pitch point = $(\omega_p + \omega_g)$ x _____

A. path of contact
B. 0
C. arc of approach
D. path of recess

Ans. B

Sol. At the pitch point, there is no relative motion between the gears.

Velocity of sliding at the pitch point = $(\omega_p + \omega_g)$ x 0 = 0.

Thus, the velocity of sliding is 0.

46. A CNC milling machine has to cut a straight slot of 20 mm width and 4 mm depth by a cutter of diameter 15 mm between points (5,5) and (20, 20). The feed rate used for milling is 30 mm/min. Milling time for the slot (in seconds) is _____?

A. 34.32
B. 42.42
C. 45.65
D. 36.54

Ans. B

Sol. Total machining length (L) = $\{(20-5)^2 + (20-5)^2\}^{1/2}$ = 21.21 mm

Feed rate (v) = 30 mm/min

$$Milling\ time\ (t_m) = \frac{L}{fN} = \frac{L}{v}$$

where: f = feed in (mm/rev)

$$t_m = \frac{21.21}{30} = 0.707\ min$$

Thus, t_m = 60 × 0.707 = 42.42 seconds

47. Hypoeutectoid steels on cooling during annealing process converts to _____.

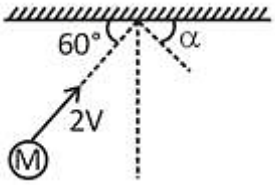
A. α-pearlite
B. Cementite
C. Austenite
D. None of the mentioned

Ans. A

Sol.

- If one cools a hypoeutectoid steel from a point in the austenite region, reaching the A_3 line, ferrite will form from the austenite. This ferrite is called proeutectoid ferrite.
- When A_1 is reached, a mixture of ferrite and iron carbide forms from the remaining austenite.
- Thus, the microstructure of a hypoeutectoid steel upon cooling would contain proeutectoid ferrite plus pearlite (α+ Fe3C).

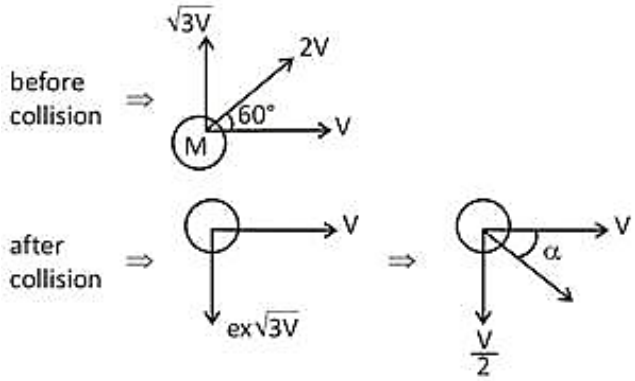
48. Ball of mass m collides with the wall of angle 60° of incidence with restitution value of $e = \frac{\sqrt{3}}{2}$. Find the angle of reflection 'α' as shown in diagram.



A. $\tan^{-1}(1.5)$
B. $\tan^{-1}(2)$
C. 60°
D. 45°

Ans. A

Sol.



$$\tan\alpha = \frac{\left(\frac{3V}{2}\right)}{V} = \frac{3}{2} \Rightarrow \alpha = \tan^{-1}\left(\frac{3}{2}\right)$$

49. If number of turns are 8 and wire diameter of spring is 3mm, then solid length of the helical spring is given by?

A. None of the listed
B. 27mm
C. 24mm
D. 21mm

Ans. C

Sol. Given ,

wire diameter of spring is(d) 3mm

number of turns(n) are 8

Solid length=nxd=no of turns x wire diameter

Ls = 8×3 = 24 mm

50. An isentropic nozzle is discharging steam through critical pressure ratio. If the back pressure is further decreased, the discharge will

A. Decrease

B. increase

C. Remain unaffected

D. Come to a dead stop due to shock waves

Ans. C

Sol. Isentropic nozzles is discharging steam through critical pressure ratio

$$\frac{P_2}{P_1} = \left(\frac{2}{r+1}\right)^{\frac{r}{r-1}}$$

If back pressure is further decreased, there will be no effect on discharge. At throat we get the maximum discharge.

For air : $\frac{P_2}{P_1} = 0.528 \quad (r = 1.4)$

For superheated: $\frac{P_2}{P_1} = 0.545 \ (r = 1.3)$

For wet steam: $\frac{P_2}{P_1} = 0.577 \ (r = 1.135)$

51. Which of the following statements are TRUE?

A. During cooling and humidification process, the enthalpy of air increases

B. During cooling and humidification process, the enthalpy of air remains constant

C. During cooling and humidification process, the enthalpy of air may increase, decrease or remain constant depending upon the temperature of the wet surface

D. None of the above

Ans. D

Sol. During cooling and humidification process, the enthalpy of air may increase, decrease or remain constant depending upon the temperature of fluid used in the air washer being used for conditioning the incoming air is striking.

52. A heat engine receives 1000 kJ of heat and produces 600 kJ of work. The amount of heat rejected in kJ and the efficiency percentage of the engine, respectively will be

A. 400, 40%

B. 400, 60%

C. 600, 40%

D. 600, 60%

Ans. B

Sol. The amount of heat rejected in kJ = 1000-600 = 400 kJ

and the efficiency percentage of the engine will be

$$= \frac{\text{Work produced}}{\text{Heat added}} = \frac{600}{1000} \times 100 = 60\,\%$$

53. The velocity of the slider in a single slider crank mechanism is given by_____.

A. $V = r\omega\left[\cos\theta - \frac{\cos 2\theta}{2n}\right]$

B. $V = r\omega\left[\sin\theta + \frac{\sin 2\theta}{2n}\right]$

C. $V = r\omega\left[\cos\theta + \frac{\cos 2\theta}{2n}\right]$

D. $V = r\omega\left[\sin\theta - \frac{\sin 2\theta}{2n}\right]$

Ans. B

Sol. The velocity of the slider in a single slider crank mechanism is given by

$$V = r\omega\left[\sin\theta + \frac{\sin 2\theta}{2n}\right]$$

Where

r — crank radius

ω — angular velocity of crank

θ — angle turned by crank from IDC/TDC

n = Obliquity Ratio

54. Which one of the following is the correct temperature range for hot extrusion of copper?

A. 200 – 250°C

B. 400 – 500°C

C. 550 – 650°C

D. 650 – 975°C

Ans. D

Sol. Extrusion temperature ranges for various metals are:

Lead - 200 – 250°C

Aluminium - 375 – 475°C

Copper - 650 – 975°C

Steel - 875 – 1300°C

So, the correct option is (d).

55. In turbulent flow, Prandtl's mixing length signifies

A. the magnitude of turbulent kinetic energy

B. the ratio of mean free path to characteristic length of the flow field

C. the wavelength corresponding to the lowest frequency present in the flow field

D. the average distance perpendicular to the mean flow covered by the mixing particles

Ans. D

Sol. Mixing Length: distance that a lump of fluid travels before losing its own momentum and acquiring the momentum of new layer

56. If a mass of moist air in an airtight vessel is heated to a higher temperature, then _____.

A. specific humidity of the air increases

B. specific humidity of the air decreases

C. relative humidity of the air increases

D. relative humidity of the air decreases

Ans. D

Sol. Relative Humidity $= \frac{\text{actual vapor density}}{\text{saturation vapour density}} \times 100$

actual vapor density decreases with increase in temperature and if actual vapor density decreases than relative humidity also decreases.

57. A kinematic chain consists of n links. The maximum number of possible inversions for this chain is

A. n

B. n!

C. n−1

D. n!−1

Ans. A

Sol. Inversions of a mechanism are the different mechanisms obtained by fixing different links in a kinematic chain. Thus, the number of inversions is equal to the number of links in the mechanism.

58. The metacentric height of battle ships is

A. 0.3 m to 0.8 m
B. 1.0 m to 1.5 m
C. 2.5 m to 3.5 m
D. 5.0 m to 6.0 m

Ans. B

Sol. The metacentric height (GM) is a measurement of the initial static stability of a floating body. It is calculated as the distance between the centre of gravity of a ship and its metacentre. Max. Metacentric height given any ship is below 1m but in case of battle ship we don't need of comfort ability of army we considered the factor of safety of army so we give the ranges of 1-1.5m.

59. If velocity potential function exists in a fluid flow, then_____.

A. Flow may or may not be rotational
B. Flow is always irrotational
C. Can't say about rotationality
D. Flow is always discontinuous

Ans. B

Sol.

- Curl of gradient of a scalar function is Zero.
- If the Curl of the velocity vector is zero, there exists a scalar function (Velocity potential in our case).
- Curl of velocity vector equal to zero means the flow is irrotational.

So, Velocity potential exists only for an irrotational flow.

60. Euler's dimensionless number relates _____.

A. Inertia force and Pressure force
B. Inertia force and gravity force
C. Buoyant force and inertia force
D. Buoyant force and viscous force

Ans. A

Sol. Euler's dimensionless number relates Pressure force and inertia force.

$$Eu = \sqrt{\frac{F_i}{F_p}} = \frac{V}{\sqrt{\frac{P}{\rho}}}$$

Where F_i=Inertia force

Fp=Pressure force

61. Two sheets of varying cross-sections were to be weld using a spot welding process. The sheets needed to withstand tension loads, so the factor of safety should be;

A. Smaller than parts fastened by bolts
B. larger than parts fastened by bolts
C. Same for both
D. Has no effect

Ans. B

Sol. Spot welding is a resistance welding method. When the metals are spot welded, the materials being welded may undergo metallurgical changes due to welding.

Taking into account these metallurgical changes So somewhat larger factor of safety should be used when parts are fastened by spot welding rather than by bolts or rivets.

62. Open type compressors are used in:

A. Domestic refrigeration and air conditioning

B. Large industrial and commercial refrigeration systems

C. Only CFC based refrigeration systems

D. Only in natural refrigerant based systems

Ans. B

Sol. In open type compressors, motor is completely outside the compressor body. Mostly used in medium and large chiller packages especially with reciprocating and screw compressors mostly in low temperature refrigeration and comfort air conditioning applications sometimes.

The advantages of an open type compressor are:

1. The motor winding, unlike in semi-hermetically / hermetically sealed compressors, is not cooled by the refrigerant gas and hence, motor heat is not a load on the refrigeration process. As a result the chiller package will be slightly more energy efficient than that with a hermetically sealed motor.

2. Serviceability: If case of a motor winding burns out, the refrigerant does not get contaminated, again unlike semi-hermetically / hermetically sealed motors. Motor can be detached by an experienced engineer/ technician and replaced with a standby. The downtime due to motor failure could be low if stock is maintained by the user.

63. Hardenability of steel is a measure of _____.

A. the ability to harden when it is cold worked

B. the maximum hardness that can be obtained when it is austenitized and then quenched

C. the ability to retain its hardness when it is heated to elevated temperatures

D. the depth to which required hardening is obtained when it is austenitized and then quenched

Ans. D

Sol.

- Hardenability describes how deep a metal can be hardened upon quenching from high temperature and can also be referred to as the depth of hardening.
- The ability of steel to form martensite on quenching is referred to as the hardenability.

64. An air washer can work as a

A. Filter only

B. Humidifier only

C. Dehumidifier only

D. All of the above

Ans. D

Sol. An air washer is a hybrid appliance, a combination of an air purifier and a humidifier. Like conventional humidifiers, air washers add therapeutic moisture to the air. And, like a conventional air purifier, an air washer removes symptom-triggering allergens from the air.

65. A two-cylinder two-stroke have bore and stroke 300 mm and 500 mm respectively, Find the mean piston speed in meter per second at 300 rpm _____.

A. 2.5

B. 5

C. 10

D. Insufficient data

Ans. B

Sol. Mean piston speed is given by:

$$C = \frac{2LN}{60}$$

Where L = stroke length

N = rpm of engine

Stroke (L) = 500 mm = 0.5 m

N = 300 rpm

$$C = \frac{2 \times 0.5 \times 300}{60} = 5\ m/s$$

66. In the design of Pelton wheel, the width of bucket is generally taken as __ times the diameter of jet.

A. 2 B. 1.2

C. 3 D. 5

Ans. D

Sol. In design of Pelton Wheel, generally

Width of bucket = 5d

Depth of bucket = 1.2d

67. Solid shrinkage of castings is compensated by providing _____.

A. shrinkage allowance in patterns B. bottom risers

C. shorter length of runner D. longer height of sprue

Ans. A

Sol.

- The shrinkage allowance is provided in patterns to compensate the solid shrinkage of castings.
- Liquid shrinkage is compensated by providing riser only during mould making.

68. The grit size of the abrasives used in the grinding wheel is usually specified by the: -

A. hardness number

B. size of the wheel

C. softness or hardness of the abrasive

D. mesh number

Ans. D

Sol. Mesh size is the mesh number and its relationship to the size of the openings in the mesh and thus the size of particles that can pass through these openings.

69. In a reaction turbine.....

A. The steam is allowed to expand in the nozzle, where it gives a high velocity before it enters the moving blades

B. The expansion of steam takes place partly in the fixed blades and partly in the moving blades

C. The steam is expanded from a high pressure to a condenser pressure in one or more

nozzles

D. The pressure and temperature of steam remains constant

Ans. B

Sol. In rection steam turbine, the steam is partly expanded in fixed blades and partly in moving blades.

Drop of pressure takes place in both moving and fixed blades

70. Which of the following option is correct regarding parallel axis theorem i.e. $I_2 = I_1 + Ad^2$

A. I_2 = self moment of inertia about centroidal axis

B. I_1 = self moment of inertia about centroidal axis

C. The equation written is wrong

D. The correct equation is $I_2 = I_1 + Ad$

Ans. B

Sol. A = Area of cross- section

D = perpendicular distance between corresponding axis.

I_1 = self moment of inertia about centroidal axis

I_2 = moment of inertia about axis at distance D from centroidal axis

71. West Bengal shares boundaries with ..... countries.

A. 2 B. 4

C. 1 D. 3

Ans. D

Sol. • **West Bengal** is bordered by **three** countries named **Bangladesh, Nepal**, and **Bhutan.**

• **West Bengal** shares the border with the Indian states of **Odisha**, **Jharkhand**, **Bihar, Sikkim**, and **Assam**.

• **Arunachal Pradesh** shares the border with **Myanmar**, **China**, and **Bhutan**.

• **Sikkim** shares the border with **Bhutan, China**, and **Nepal**.

72. Coins of..... denomination were introduced by the Reserve Bank of India (RBI) to mark MG Ramachandran's 1 birth centenary.

A. 200 B. 100

C. 500 D. 20

Ans. B

Sol. • Coins of 100 denomination were introduced by the Reserve Bank of India (RBI) to mark MG Ramachandran's 1 birth centenary.

• MG Ramachandran was awarded Bharat Ratna posthumously in 1988.

• The autobiography Naan Yaen Piranthen of MG Ramachandran was published in 2003.

73. The headquarters of CAPART is located in_____.

A. Mumbai B. New Delhi

C. Lucknow D. Bhopal

Ans. B

Sol. * The Council for Advancement of People's Action and Rural Technology (CAPART) was launched in 1986.

* It is an autonomous body registered under the Societies Registration Act 1860.

* It is chaired by the **Union Minister for Rural Development**.

* It is headquartered in **New Delhi**.

* Its main objective is to encourage, promote and support voluntary action in the implementation of projects for the growth of rural prosperity.

74. ....., the Sultan of Delhi shifted his capital from Delhi to Daulatabad.

A. Iltutmish
B. Akbar
C. Ghiyas-ud-din Balban
D. Muhammad-bin-Tughlaq

Ans. D

Sol. • Muhammad-bin-Tughlaq is the Sultan of Delhi shifted his capital from Delhi to Daulatabad.

• He was sultan of delhi from 1325 to 1351.

• The founder of Tughlaq dynasty was Muhammad-bin-Tughlaq's father Ghiasuddin Tughlaq.

75. Which of the following country has the longest coastline in the world?

A. Australia
B. Norway
C. Canada
D. Indonesia

Ans. C

Sol. • **Canada has the longest coastline in the world**.

• It is the **second-largest country of the world** by total area.

• The **capital of Canada** is **Ottwa** and **Currency** is **Canadian Dollar**.

• **Gujarat** is the **largest mainland coastline** state in India.

76. The Black soil is also known as ..... soil.

A. Bhangar
B. Humus
C. Crystalline
D. Regur

Ans. D

Sol. • The Black soil is also known as **Regur soil**.

• The black color of black soil is due to excess of iron.

• Apart from black soil, it is also called Shregun, Regur, Cotton soil, and Lava soil.

• It is rich in magnesium, lime and iron and organic matter.

• It is found abundantly in Maharashtra, Karnataka, Gujarat and Madhya Pradesh.

77. Which Vitamin helps in clotting of blood?

A. Vitamin A
B. Vitamin C
C. Vitamin B
D. Vitamin K
E. None of the above/More than one of the above

Ans. D

Sol. Vitamin K helps to make various proteins that are needed for blood clotting and the building of bones. Prothrombin is a vitamin K-dependent protein directly involved with blood clotting. Osteocalcin is another protein that requires vitamin K to produce healthy bone tissue.

78. The process to separate impurities from water, butter from curd, small stones from wheat etc. is called

A. Mixture
B. separation
C. Filtration
D. Sublimation

Ans. B

Sol. Milk or curd is churned to separate the butter. Grain is separated from stalks, while harvesting. The process to separate impurities from water, butter from curd, small stones from wheat etc. is called separation.

79. Elecphanta Island is located at

A. Goa Coast
B. Mumbai Coast
C. Ganga Delta
D. Kutch Coast

Ans. B

Sol. Elecphanta Island is located at Mumbai Coast. Elecphanta caves are a UNESCO world heritage site.

80. Which of the following city is known as "The City of Lakes"?

A. Mysore
B. Jaipur
C. Cherrapunji
D. Udaipur

Ans. D

Sol. The correct answer is option D, i.e., Udaipur. There is very less rainfall in Rajasthan. Most of its cities build lakes to store rainwater. Udaipur is also known as the 'The City of Lakes', for its beautiful and majestic lakes.

81. Name the first city in India to use a robot to control traffic.

A. Kochi
B. Indore
C. Varanasi
D. Jaipur

Ans. B

Sol.
- **The first city in India to use a robot to control traffic is Indore**.
- The **height of the robot is 14 feet** and It **runs on a 12 watt power supply**.
- **Indore** is the **cleanest city of India**.
- **Jaipur** is also called as the **Pink City of India**.

82. Which two countries passport shares top rank in the Henley Passport Index 2022, released in January 2022?

A. Japan and Singapore
B. Finland and New Zealand
C. Italy and Luxembourg
D. UK and Germany
E. Spain and Italy

Ans. A

Sol. * In the latest Henley Passport Index 2022 for quarter 1 the passport of Japan and Singapore ranked at top.

* Germany and South Korea hold onto joint 2nd spot on the latest ranking, with passport holders able to access 190 destinations visa-free, while Finland, Italy, Luxembourg, and Spain share 3rd place, with a score of 189.

* India's passport power has improved this quarter compared to 2021.

* It now ranks at 83rd position in the Henley Passport Index, climbing seven places from 90th rank last year.

83. In January 2022, an 'MSME Technology Centre' was inaugurated by PM Narendra Modi in which place?

A. Ahmedabad
B. Puducherry
C. Gurugram
D. Bengaluru
E. Hyderabad

Ans. B

Sol. * On the occasion of the National Youth Day 2022, the birth anniversary of Swami Vivekananda, Prime Minister (PM) Narendra Modi virtually inaugurated an 'MSME Technology Centre', which will function under the Union Ministry of Micro, Small and Medium Enterprises (MSME), in Puducherry.

* The centre was inaugurated during the inauguration event of the 25th National youth Festival (12th & 13th January 2022) in Puducherry.

* He also inaugurated the 'Perunthalaivar Kamarajar Manimandapam', a modern auditorium with an open-air theatre in Puducherry.

84. In collaboration with which of the following bodies has the NITI Aayog's Atal Innovation Mission (AIM) recently launched 'ATL Space Challenge 2021' ?

A. ISRO & DRDO
B. ISRO & CBSE
C. Hindustan Aeronautics Limited & CBSE
D. Hindustan Aeronautics Limited & ISRO
E. None of the above

Ans. B

Sol. * NITI Aayog's Atal Innovation Mission (AIM) has declared the results of 'ATL Space Challenge 2021', after successful completion and overwhelming participation from young innovators

* It was launched in collaboration with ISRO and CBSE

* The challenge was designed for all the school students, mentors and teachers across the country

* It witnessed over 2500 submissions from both ATL and Non-ATL students across the country from which 75 top innovators were selected and announced.

85. Which bank has been adjudged Best Private Bank in India at the Global Private Banking Awards 2021, organised by Professional Wealth Management (PWM)?

A. HDFC Bank
B. ICICI Bank
C. Yes Bank
D. Axis Bank
E. IndusInd Bank

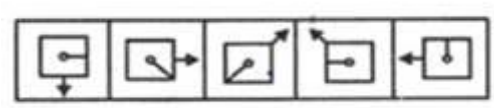
Ans. A

Sol. * HDFC Bank has been adjudged Best Private Bank in India at the Global Private Banking Awards 2021, organised by Professional Wealth Management (PWM).

* Professional Wealth Management (PWM) specialises in analysing the growth strategies of private banks and the regional financial centres in which they operate.

* The award was given for contributing to accelerate key trends, including digitalisation, communication and investment in environmental, social and governance (ESG) strategies.

86. Select the figure that will come next in the following series.



A. 

B. 

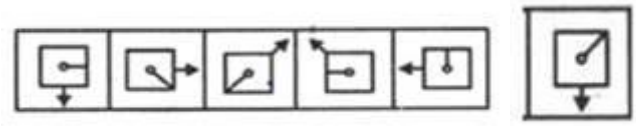
C. 

D. 

Ans. C

Sol. The arrow is moving in 90 degrees and then 45 degrees alternatively in each step in the anticlockwise direction.

Also, the figure inside the square is also moving in 90 degrees and then 45 degrees alternatively in each step in the clockwise direction.



Hence, option C is the correct response.

87. In a certain language, 'roses are yellow' means 'mee muk pic', 'white flowers' means 'nil dic', and flowers are fruits' means 'pic muk dic'. What is the code for 'white' in that language?

A. nil
B. pic
C. dic
D. muk

Ans. A

Sol. 'roses are yellow' = 'mee muk pic'_____(1)

'white flowers' = 'nil dic' _____(2)

'flowers are fruits' = 'pic muk dic' _____(3)

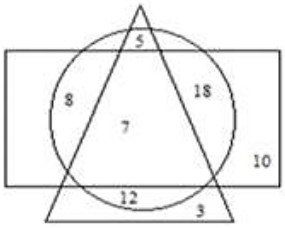
From (2) and (3), flowers=dic

Therefore, from (2), white=nil

Hence, option A is the correct answer.

88. In the following diagram, the rectangle represents doctors, the triangle represents players and the circle represents philosophers.

The number in different segments show the number of persons.



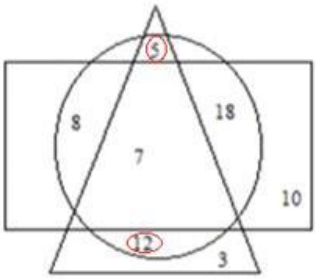
According to the given diagram, How many players are philosophers but not Doctors?

A. 12 B. 17

C. 5 D. 7

Ans. B

Sol. Here the number circled red in the diagram below shows the number of players are philosophers but not Doctors i.e. 5 and 12.



So, number of players are philosophers but not Doctors =5+12=17

Hence, option(B) is the correct response.

89. Which number will come next to the series?

1,14,39,84, ?

A. 104 B. 155

C. 175 D. 110

Ans. B

Sol.

$1^3 + 1^2 + 1 = 1$

$2^3 + 2^2 + 2 = 14$

$3^3 + 3^2 + 3 = 39$

$4^3 + 4^2 + 4 = 84$

$5^3 + 5^2 + 5 = 155$

Next number of the series is 155.

90. **Which number will come next in the following series?**

1, 3, 7, 15, 31, 63, _____

A. 126 B. 127

C. 125 D. 139

Ans. B

Sol. Logic is-

1+2=3

3+4=7

7+8=15

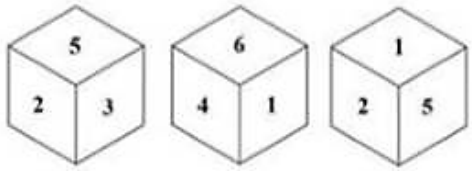
15+16=31

31+32=63

63+64=127

Hence, option(B) is the correct response.

91. **Three different position of the same dice are shown below. Which number is on the face opposite the face showing "4"?**

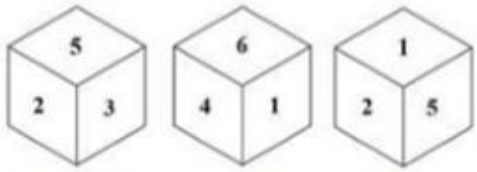


A. 5 B. 3

C. 2 D. 6

Ans. A

Sol.



Fig(1) Fig(2) Fig(3)

From fig(1) and fig(3), 2 and 5 are the consecutive side face of 3, also 2 and 5 are the consecutive side face of 1, therefore 3 is the opposite of 1.

From fig(2) and fig(3), 4, 6, 5, 2 are the consecutive side face of 1.

From 4, 6, 5, 2-

4 is opposite of 5 and 6 is opposite of 2.

Hence, the correct option is A.

92. **Two statements are given, followed by two conclusion I and II. Assuming these statements to be true, even if they seem to be at variance with commonly known facts, decide which of the given conclusion logically follow (s) from the statements.**

Statements:

All plants are flowers.

No flower is blue.

Conclusions:

I. Some plants are blue.

II. Those plants that are not flowers are blue.

A. Only conclusion II follows.

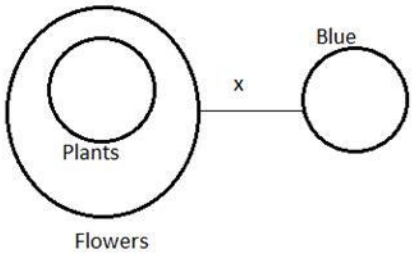
B. Only conclusion I follows.

C. Both conclusion I and II follow.

D. Neither conclusion I nor II follow.

Ans. D

Sol. The minimum possible diagram is-



Conclusions:

I. Some plants are blue - (It does not follow as No flower is blue.)

II. Those plants that are not flowers are blue - (It does not follow as All plants are flowers.)

So, Neither conclusion I nor II follows.

Hence, option D is the correct answer.

93. A Nurse moved 90 m in the East in a hospital to look for her duty Doctor, then she turned left and went 20 m. After this she turned left and after going 30 m she reached I.C.U but the Doctor was not there. From there she went 100 m to her north and met her doctor. What distance did she moved to meet her duty doctor from the starting point.

A. 80m

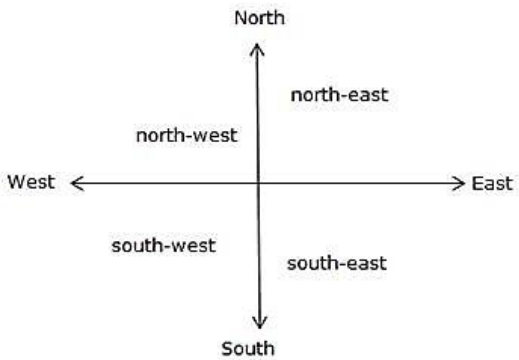
B. 240m

C. 140m

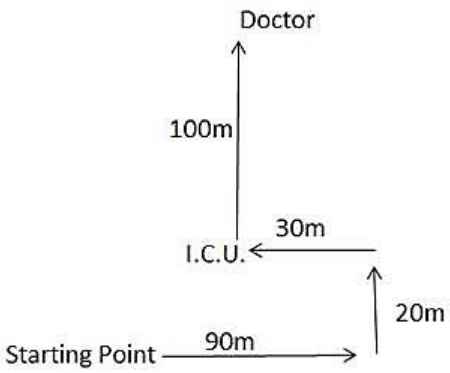
D. 120m

Ans. B

Sol. As we know-



We can draw the following diagram to represent the text given in the question-



Required distance=90+20+30+100=240m

Hence, option B is the correct answer.

94. **Which of the following interchanges of signs and numbers would make the given equation current?**

18 — 3 ÷ 6 + 24 × 12 = 48

A. × and —, 3 and 6

B. ÷ and —, 12 and 6

C. ÷ and ×, 3 and 12

D. × and +, 3 and 6

Ans. A

Sol. By checking Option A,

18 — 3 ÷ 6 + 24 × 12 = 48

After changing the symbols,

18 × 6 ÷ 3 + 24 - 12 = 48

Applying BODMAS we get,

= 36 + 24 – 12

= 60 – 12

= 48

Therefore, 18 — 3 ÷ 6 + 24 × 12 = 48 is the correct equation.

As, we found the correct answer, so no need to check more options.

Hence, option A is the correct answer.

95. Select the option in which the given figure is embedded. (Rotation is not allowed)

A. 

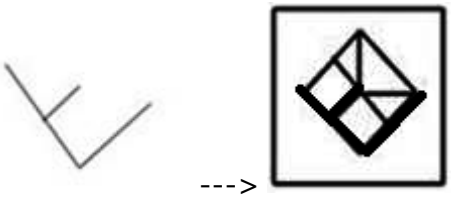
B. 

C. 

D. 

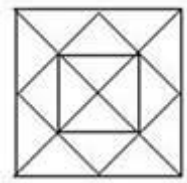
Ans. B

Sol. After carefully observing the figures given in the question, it is very clear that the question figure is embedded in the answer figure (D). It is shown as given below:



Hence, option B is the correct response.

96. **Find the number of squares in the following figure.**

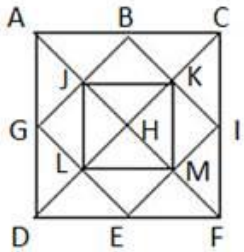


A. 9 B. 4

C. 6 D. 7

Ans. D

Sol.



There are 7 squares in the given figure; ACFD, BGEI, JKML, GJHL, BKHJ, HMIK, LHME.

Hence, option D is correct.

97. Select the option that will come next in the given series.

A.  B. 

C.  D. 

Ans. A

Sol. After observation, it is clear that answer figure (a) will be the missing figure.

Logic- 3rd figure is the opposite figure of 1st similarly, 4th figure is the opposite figure of 2nd.

Hence, option (A) is the correct response.

98. **Two statements are given, followed by two conclusion I and II. Assuming these statements to be true, even if they seem to be at variance with commonly known facts, decide which of the given conclusion logically follow (s) from the statements.**

Statements:

Some boxes are dolls.

All dolls are pen.

Conclusion:

I. Some boxes are pens.

II. Some pens are boxes.

III. Some pens are dolls.

IV. All pen are dolls.

A. Only conclusion II, III and IV follow.

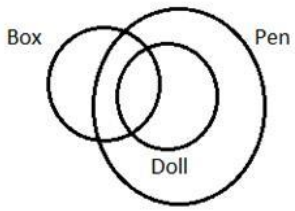
B. Only conclusion I, II and III follow.

C. Only conclusion I, II and IV follow.

D. All the conclusion follow.

Ans. B

Sol. Minimum possible diagram is-



Conclusion:

I. Some boxes are pens.(It follows as its obvious from the above diagram.)

II. Some pens are boxes.(It also follows as its obvious from the above diagram.)

III. Some pens are dolls. .(It also follows as its obvious from the above diagram.)

IV. All pen are dolls. .(It does not follow as its just a possibility, not surety.)

So, Only conclusion I, II and III follow.

Hence, option B is the correct answer.

99. **Select the correct alternative to indicate the arrangement of the following words in a logical and meaningful order.**

1) Gateway of India
2) World
3) Mumbai
4) India
5) Maharashtra

A. 2, 4, 5, 1, 3
B. 4, 2, 5, 3, 1
C. 2, 4, 5, 3, 1
D. 4, 2, 5, 1, 3

Ans. C

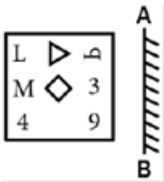
Sol. logical and meaningful order is,

2. World
4. India
5. Maharashtra
3. Mumbai
1. Gateway of India

Correct sequence = 2, 4, 5, 3, 1

Hence, option D is the correct answer.

100. Select the correct mirror image of the given figure when the mirror is placed at line AB.



A. 

B. 

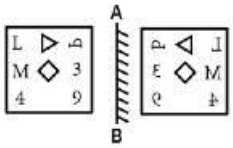
C. 

D. 

E. None of the above

Ans. B

Sol. In a plane mirror, a mirror image is a reflected duplication of an object that appears almost identical, but it is reversed in the direction perpendicular to the mirror surface. As an optical effect it results from reflection of substances such as a mirror or water.



Hence, option B is the correct answer.

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