APPSC AE CE+ME 2022 (English)

APPSC Assistant Engineers_15th May 2022 S2

Hall Ticket Number	
Participant Name	
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Test Date	15/05/2022
Subject	Civil - Mechanical

Note : NEGATIVE MARKS: As per G.O. Ms. No.235 Finance (HR-I, Plg & Policy) Dept., Dt.06/12/2016, for each wrong answer will be penalized with 1/3rd of the marks prescribed for the question

Section : **Civil - Mechanical**

Q.1 Variation in shear force in a cantilever beam (length = ℓ), carrying a load, the intensity of which varies uniformly from zero at the fixed end to w per unit run at the free end, is (x is distance from free end):

Ans

✗ 1. $w\left(x^2-\frac{x}{2\ell}\right)$

✗ 2. $w\left(x^2-\frac{x^2}{2\ell}\right)$

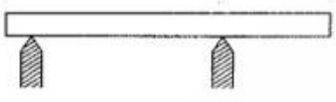
✓ 3. $w\left(x-\frac{x^2}{2\ell}\right)$

✗ 4. $w\left(x^2-\frac{x^3}{2\ell}\right)$

Question ID : **63068074979**
Chosen Option : **3**

Q.2 **Which of the following is the overhanging beam?**

Ans

✓ 1. 

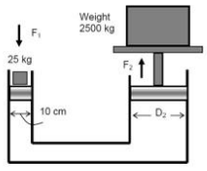
✗ 2. 

✗ 3. 

✗ 4. 

Question ID : **63068074963**
Chosen Option : **1**

Q.3 A hydraulic lift is used to lift a weight, as shown in the following figure. The diameter of the piston (D_2) on which the weight is to be placed is:



Ans

✗ 1. 1 cm

✓ 2. 1 m

✗ 3. 1 mm

✗ 4. 0.1 m

Question ID : **63068074946**
Chosen Option : **2**

Q.4 **A simply supported beam (length =) has a distributed load of intensity varying with zero at each end to w per unit run at midspan. The variation in shear force will be:**

Ans

✗ 1. $w\left(\frac{\ell}{4}-\frac{2x^2}{\ell}\right)$

✗ 2. $w\left(\frac{\ell}{8}-\frac{2x^2}{\ell}\right)$

✓ 3. $w\left(\frac{\ell}{4}-\frac{x^2}{\ell}\right)$

✗ 4. $w\left(\frac{\ell}{8}-\frac{4x^2}{\ell}\right)$

Question ID : **63068074980**
Chosen Option : **3**

Q.5 **If the specific gravity of a fluid is 1.26, its specific weight will be (take density of water = 1000 kg/m^3 and acceleration due to gravity = 10 m/s^2):**

Ans

✓ 1. 12.6 kN/m^3

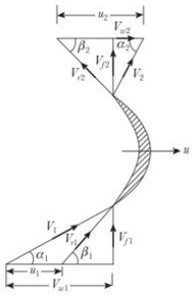
✗ 2. 1.26 kN/m^3

✗ 3. 1.26 N/m^3

✗ 4. 12.6 N/m^3

Question ID : **63068075012**
Chosen Option : **1**

Q.6 The jet at a velocity V_1 at an angle α_1 strikes a curved blade moving with a velocity u, as shown in the following figure. The Euler's head is given by:



Ans

✗ 1. $\frac{V_{w1}u_2 - V_{w2}u_1}{g}$

✓ 2. $\frac{V_{w1}u_1 - V_{w2}u_2}{g}$

✗ 3. $\frac{V_{f1}u_1 - V_{f2}u_2}{g}$

✗ 4. $\frac{V_{f1}u_2 - V_{f2}u_1}{g}$

Question ID : **63068075072**
Chosen Option : **2**

Q.7 **For a centrifugal pump, the ratio of the actual flow rate to the theoretical flow rate is known as:**

Ans

✗ 1. mechanical efficiency

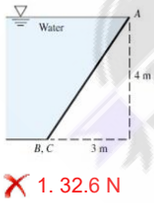
✗ 2. overall efficiency

✗ 3. hydraulic efficiency

✓ 4. volumetric efficiency

Question ID : **63068075079**
Chosen Option : **4**

Q.8 Panel ABC in the slanted side of a water tank (shown in the following figure) is an isosceles triangle with vertex at A and base BC = 2 m. The water force on the panel is (take specific weight of water as 9790 N/m^3):



Ans

✗ 1. 32.6 N

✗ 2. 32.6 kN

✗ 3. 131.0 N

✓ 4. 131.0 kN

Question ID : **63068075023**
Chosen Option : **2**

Q.9 **The variation of atmospheric pressure with altitude is given by (where P_a and T_a are the pressure and temperature at sea level, β is the lapse rate, is the acceleration due to gravity and R is gas constant):**

Ans

✔ 1. $p = p_a\left(1-\frac{\beta z}{T_a}\right)^{\frac{g}{R\beta}}$

✘ 2. $p = p_a\left(\frac{\beta z}{T_a}-1\right)^{\frac{g}{R\beta}}$

✘ 3. $p = p_a\left(\frac{\beta z}{T_a}-1\right)^{\frac{R\beta}{g}}$

✘ 4. $p = p_a\left(1-\frac{\beta z}{T_a}\right)^{\frac{R\beta}{g}}$

Question ID : **63068075015**
Chosen Option : **--**

Q.10 The ratio of hoop stress to hoop strain in the hemispherical portion of a thin cylinder (with uniform thickness 't') is (E = Young's modulus, ν = Poisson's ratio):

Ans

✔ 1. $\frac{E}{(1-\nu)}$

✘ 2. $\frac{2E}{(2-\nu)}$

✘ 3. $\frac{E}{(2-\nu)}$

✘ 4. $\frac{2E}{(1-\nu)}$

Question ID : **63068074999**
Chosen Option : **2**

Q.11 **A _____ is a set of fluid particles that form a line at a given instant.**

Ans

✔ 1. timeline

✘ 2. streamline

✘ 3. streakline

✘ 4. pathline

Question ID : **63068075026**
Chosen Option : **3**

Q.12 **Secant formula is applicable for:**

Ans

✔ 1. long columns under eccentric loading

✘ 2. short columns under eccentric loading

✘ 3. long columns under axial loading

✘ 4. short columns under axial loading

Question ID : **63068075006**
Chosen Option : **1**

Q.13 The power specific speed N_{sp} for a turbine is (where bhp = available power, H = head, ρ = fluid density, g = acceleration due to gravity, n = shaft speed):

Ans

✗ 1. $\frac{\rho^{3/2}(gH)^{7/4}}{n(bhp)^{3/2}}$

✗ 2. $\frac{n(bhp)^{3/2}}{\rho^{3/2}(gH)^{7/4}}$

✓ 3. $\frac{n(bhp)^{1/2}}{\rho^{1/2}(gH)^{5/4}}$

✗ 4. $\frac{\rho^{1/2}(gH)^{5/4}}{n(bhp)^{1/2}}$

Question ID : **63068075076**
Chosen Option : **3**

Q.14 Based on the two statements given below, choose the correct answer.

Statement A: A point where the whole weight of the body is assumed to act is called the centre of gravity.

Statement B: For a non-homogeneous plate, the coordinates for the centre of gravity and the centroid of the area are the same.

Ans

✗ 1. Statement A is incorrect, but statement B is correct.

✗ 2. Both statements A and B are incorrect.

✗ 3. Both statements A and B are correct.

✓ 4. Statement A is correct, but statement B is incorrect.

Question ID : **63068074942**
Chosen Option : **4**

Q.15 If the load on a column is increased to a value that on its removal the deflection remains and the column doesn't return to its original position, the load is known as:

Ans

✓ 1. critical load

✗ 2. breaking load

✗ 3. ultimate load

✗ 4. yield load

Question ID : **63068075001**
Chosen Option : **1**

Q.16 The method of joints is preferred in the analysis of plane frames if forces are required to be determined in:

Ans

✗ 1. one member only

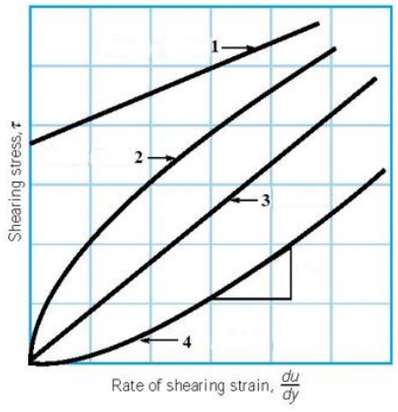
✓ 2. in all the members

✗ 3. two members only

✗ 4. a few members

Question ID : **63068074985**
Chosen Option : **2**

Q.17 In the graph of shearing stress vs. rate of shearing strain, which of the following lines represent shear thinning fluid?



Ans

✗ 1. 3

✗ 2. 1

✓ 3. 2

✗ 4. 4

Question ID : **63068075011**
Chosen Option : **3**

Q.18 **The loss coefficient, K_{SE}, of flow entering from a pipe of smaller diameter (d) to a pipe of larger diameter (D), known as sudden expansion, is:**

Ans

✗ 1. $K_{SE} = \left(1 - \frac{d^2}{D^2}\right)^{1/2}$

✗ 2. $K_{SE} = \left(1 - \frac{d}{D}\right)^2$

✓ 3. $K_{SE} = \left(1 - \frac{d^2}{D^2}\right)^2$

✗ 4. $K_{SE} = \left(1 - \frac{d^2}{D^2}\right)$

Question ID : **63068075053**
Chosen Option : **3**

Q.19 **The relationship between hydraulic grade line (HGL) and the energy grade line (EGL) is:**

Ans

✓ 1. HGL = EGL – velocity head

✗ 2. HGL = EGL – pressure head

✗ 3. HGL = EGL – potential head

✗ 4. HGL = EGL – (pressure head + potential head)

Question ID : **63068075060**
Chosen Option : **1**

Q.20 **A cylinder-shell may be termed as thin if the ratio of thickness of the wall to the diameter of the shell is less than:**

Ans

✗ 1. 1 : 10

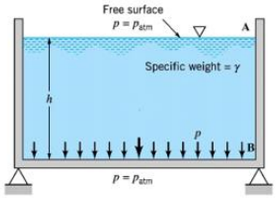
✓ 2. 1 : 15

✗ 3. 1 : 20

✗ 4. 1 : 5

Question ID : **63068074995**
Chosen Option : **2**

Q.21 For the tank shown in the following figure, the resultant force due to the pressure on side wall AB will be:



Ans

✓ 1. located at the lower half of the wall

✗ 2. located at the mid-point of the wall

✗ 3. located at the base of the wall (at point B)

✗ 4. located at the upper half of the wall

Question ID : **63068075020**
Chosen Option : **1**

Q.22 **The ratio of the maximum stress of a hollow shaft to that of a solid shaft, subjected to torsion, if both are of the same material and of the same outer diameters, is (k is the ratio of the inner diameter to the outer diameter of the hollow shaft):**

Ans

✗ 1. $\left(1-(k)^4\right)$

✓ 2. $\frac{1}{\left(1-(k)^4\right)}$

✗ 3. $\left(1-(k)^3\right)$

✗ 4. $\frac{1}{\left(1-(k)^3\right)}$

Question ID : **63068074993**
Chosen Option : **2**

Q.23 **The Darcy friction factor (f) for laminar flow in circular pipes is given by (Re_d is pipe diameter-based Reynolds number):**

Ans

✔ 1. $f = \frac{64}{Re_d}$

✗ 2. $f = \left(1.8 \log\left(\frac{Re_d}{6.9}\right)\right)^{-2}$

✗ 3. $f = 0.316 Re_d^{-1/4}$

✗ 4. $f = \frac{Re_d}{64}$

Question ID : **63068075048**
Chosen Option : **1**

Q.24 **The distance between the _____ of the rivet hole and the _____ of the plate is known as the marginal pitch.**

Ans

✗ 1. edge; nearest edge

✗ 2. edge; centre

✔ 3. centre; nearest edge

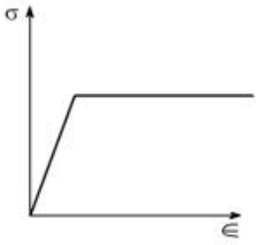
✗ 4. centre; farthest edge

Question ID : **63068074958**
Chosen Option : **3**

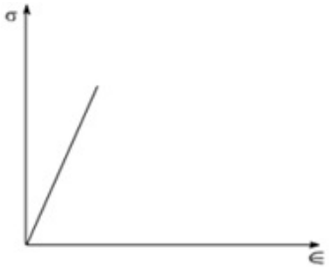
Q.25 The Stress (σ) – Strain (ϵ) diagram for a Linear-Elastic material is:

Ans

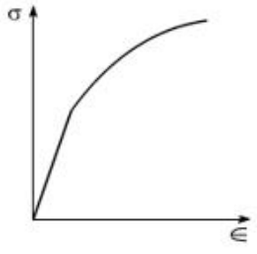
✗ 1.



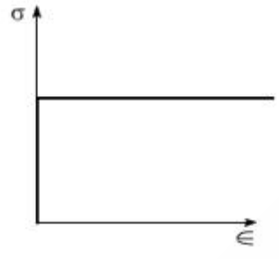
✓ 2.



✗ 3.



✗ 4.



Question ID : **63068074949**
Chosen Option : **2**

Q.26 The Bernoulli equation can be obtained by integrating F = ma along a _____.

Ans

✗ 1. pathline

✗ 2. timeline

✓ 3. streamline

✗ 4. streakline

Question ID : **63068075028**
Chosen Option : **3**

Q.27 For a centrifugal pump, for the blade exit angle less than 90°, the pump head _____.

Ans

✗ 1. remains constant with increasing discharge

✗ 2. first increases and then decreases with increasing discharge

✗ 3. increases with increasing discharge

✓ 4. decreases with increasing discharge

Question ID : **63068075080**
Chosen Option : **4**

Q.28 **The cylindrical portion of the rivet is called the _____ and the lower portion is known as the _____.**

Ans

✗ 1. body; base

✗ 2. head; base

✗ 3. head; tail

✓ 4. shank; tail

Question ID : **63068074955**
Chosen Option : **2**

Q.29 **A number of flat plates are mounted on a wheel and the jet strikes at the middle of the plate. The efficiency of this wheel is maximum when (where V is the jet velocity and u is the tangential velocity of the wheel at the middle of the plate):**

Ans

✗ 1. $u = \frac{\sqrt{2}V}{3}$

✗ 2. $u^2 = 2V(V-u)$

✓ 3. $u = \frac{V}{2}$

✗ 4. $u = \frac{V}{\sqrt{2}}$

Question ID : **63068075071**
Chosen Option : **3**

Q.30 **The empirical formula of loss coefficient, K, for a flow entering from a finite reservoir of diameter D to a pipe of diameter d is (valid up to d/D = 0.76):**

Ans

✗ 1. $K = 0.42\left(1-\frac{d^2}{D^2}\right)^{1/2}$

✗ 2. $K = 0.42\left(1-\frac{d}{D}\right)^2$

✓ 3. $K = 0.42\left(1-\frac{d^2}{D^2}\right)$

✗ 4. $K = 0.42\left(1-\frac{d^2}{D^2}\right)^2$

Question ID : **63068075054**
Chosen Option : **--**

Q.31 **Which of the following statements is NOT true about nozzle meter discharge coefficient, C_d (Re is Reynolds number, and β is ratio of nozzle diameter to pipe diameter)?**

Ans

✗ 1. Formation of Vena contracta does not take place.

✗ 2. C_d for nozzle meter is more than that for an orifice meter at the same β and Re.

✗ 3. C_d generally increases with increase in β at constant Re.

✓ 4. C_d generally increases with increase in Re at constant β.

Question ID : **63068075032**
Chosen Option : **--**

Q.32 **The flow velocity (V) from an orifice, attached to a tank of sufficiently large cross-sectional area, is (where a_c is the area of vena contracta, a_1 is the tank area, h is the height of the fluid in the tank and g is the acceleration due to gravity):**

Ans

✗ 1. $V = \sqrt{\dfrac{2gh}{1-\left(\dfrac{a_c}{a_1}\right)^2}}$

✗ 2. $V = \sqrt{\dfrac{2gh}{\left(\dfrac{a_1}{a_c}\right)^2 - 1}}$

✗ 3. $V = \sqrt{2gh}\,\dfrac{a_c}{a_1}$

✓ 4. $V = \sqrt{2gh}$

Question ID : **63068075034**
Chosen Option : **1**

Q.33 **On application of shear stress, the fluid will:**

Ans

✗ 1. flow or not depending on other factors apart from the shear stress

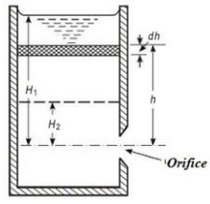
✗ 2. flow or not depending on the value of the shear stress

✓ 3. start to flow

✗ 4. not flow

Question ID : **63068075007**
Chosen Option : **3**

Q.34 In reference to the following figure, the time to completely empty the vertical cylindrical tank is (where A is the cross-sectional area of the tank, a is the area of orifice and C_d is the coefficient of discharge):



Ans

✗ 1. $\frac{2a\left(H_1^{1/2}\right)}{C_d A\sqrt{2g}}$

✗ 2. $\frac{2a\left(H_1\right)}{C_d A\sqrt{2gh}}$

✗ 3. $\frac{2A\left(h^{1/2}\right)}{C_d a\sqrt{2g}}$

✓ 4. $\frac{2A\left(H_1^{1/2}\right)}{C_d a\sqrt{2g}}$

Question ID : **63068075039**
Chosen Option : **4**

Q.35 In an open-channel flow, the hydraulic grade line is:

Ans

✓ 1. identical to the free surface of the water

✗ 2. below the free surface of the water

✗ 3. above the free surface of the water

✗ 4. can be above or below the free surface of the water

Question ID : **63068075059**
Chosen Option : **1**

Q.36 Which of the following is NOT an assumption used in the Theory of Simple Bending?

Ans

✗ 1. The material is homogeneous and isotropic.

✓ 2. The radius of curvature is small compared with the dimensions of the cross-section.

✗ 3. Initially the beam is straight.

✗ 4. Transverse planes remain plane after bending.

Question ID : **63068074970**
Chosen Option : **2**

Q.37 **The pitot formula, used for velocity measurement using pitot tube, is (where V is the flow velocity, p_0 is the stagnation pressure, p_s is the static pressure and ρ is the density):**

Ans

✗ 1. $V \approx \left[2\frac{\sqrt{(p_0 - p_s)}}{\rho}\right]^{\frac{1}{2}}$

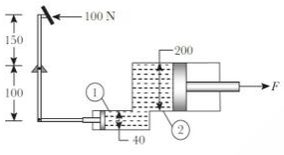
✓ 2. $V \approx \left[2\frac{(p_0 - p_s)}{\rho}\right]^{\frac{1}{2}}$

✗ 3. $V \approx \left[\frac{(p_0 - p_s)}{\rho}\right]^{\frac{1}{2}}$

✗ 4. $V \approx \left[\frac{\sqrt{(p_0 - p_s)}}{\rho}\right]^{\frac{1}{2}}$

Question ID : **63068075030**
Chosen Option : **2**

Q.38 A schematic diagram of a hydraulic braking system is shown in the following figure. If the driver applies a force of 100 N, the force F available at the brakes is (take specific gravity of the fluid to be 0.8 and units of length as mm):



Ans

✗ 1. 1.67 kN

✓ 2. 3.75 kN

✗ 3. 2.75 kN

✗ 4. 2.5 kN

Question ID : **63068074945**
Chosen Option : **--**

Q.39 **The circumferential stresses in thin cylinders are also known as:**

Ans

✗ 1. longitudinal stresses

✗ 2. radial stresses

✓ 3. hoop stresses

✗ 4. tangential stresses

Question ID : **63068074996**
Chosen Option : **3**

Q.40 **A number of flat plates are mounted on a wheel and the jet strikes at the middle of the plate. The efficiency of this wheel is (where V is the jet velocity and u is the tangential velocity of the wheel at the middle of the plate):**

Ans

✗ 1. $\frac{2V(V-u)}{u^2}$

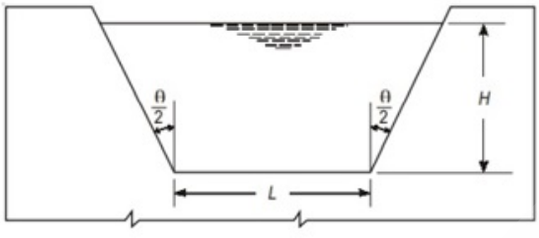
✗ 2. $\frac{V^2}{2u(V-u)}$

✓ 3. $\frac{2u(V-u)}{V^2}$

✗ 4. $\frac{u^2}{2V(V-u)}$

Question ID : **63068075070**
Chosen Option : **3**

Q.41 In a typical Cipolletti weir shown in the following figure, the value of $\frac{\theta}{2}$ is:



Ans

✗ 1. 38°

✗ 2. 22°

✓ 3. 14°

✗ 4. 30°

Question ID : **63068075047**
Chosen Option : **3**

Q.42 **For liquids or gases at rest, the pressure gradient in the vertical direction at any point in a fluid depends only on the _____ of the fluid at that point.**

Ans

✗ 1. temperature

✓ 2. specific weight

✗ 3. thermal conductivity

✗ 4. viscosity

Question ID : **63068075013**
Chosen Option : **2**

Q.43 The angle of twist of a circular shaft is given by (where T = Torque, ℓ = length of shaft, J = polar moment of inertia, G = modulus of rigidity):

Ans

✗ 1. $\frac{TG}{J\ell}$

✗ 2. $\frac{GJ}{T\ell}$

✗ 3. $\frac{TJ}{G\ell}$

✓ 4. $\frac{T\ell}{GJ}$

Question ID : **63068074990**
Chosen Option : **4**

Q.44 **The relationship between the Engineering Strain (e) and the True Strain (ε), for materials with no changes in volume during deformation, is (where ln represents natural log):**

Ans

✓ 1. ε = ln(e + 1)

✗ 2. e = ln(ε–1)

✗ 3. ε = ln(e–1)

✗ 4. e = ln(ε + 1)

Question ID : **63068074950**
Chosen Option : **4**

Q.45 **Capacity coefficient C_Q of a pump is (where Q = discharge, D = impeller diameter, n = shaft speed):**

Ans

✗ 1. $\frac{n^2D^3}{Q}$

✗ 2. $\frac{Q}{n^2D^3}$

✗ 3. $\frac{nD^3}{Q}$

✓ 4. $\frac{Q}{nD^3}$

Question ID : **63068075082**
Chosen Option : **4**

Q.46 A simply supported beam (length = ℓ), has a distributed load of intensity varying with zero at each end to w per unit run at midspan. The variation in bending moment will be (x is distance from left end):

Ans

✗ 1. $w\left(\frac{3\ell}{4}-\frac{x^3}{3\ell}\right)x$

✗ 2. $w\left(\frac{\ell}{4}-\frac{x^3}{3\ell}\right)x$

✗ 3. $w\left(\frac{3\ell}{4}-\frac{x^2}{\ell}\right)x$

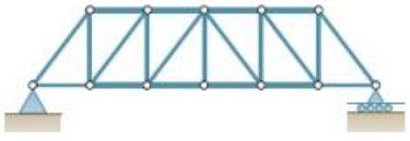
✓ 4. $w\left(\frac{\ell}{4}-\frac{x^2}{3\ell}\right)x$

Question ID : **63068074981**
Chosen Option : **4**

Q.47 Which of the is the Pratt type truss?

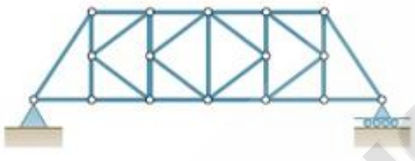
Ans

✗ 1.

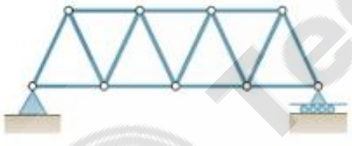


✓ 2.

✗ 3.



✗ 4.



Question ID : **63068074983**
Chosen Option : **1**

Q.48 Of the following concepts of classical mechanics, which is NOT an independent one?

Ans

✓ 1. Force

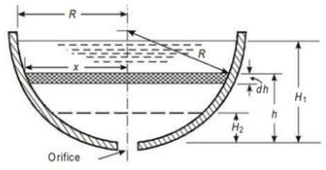
✗ 2. Space

✗ 3. Mass

✗ 4. Time

Question ID : **63068074935**
Chosen Option : **1**

Q.49 In reference to the following figure, if the hemispherical tank was full at the beginning and it is completely emptied, the time taken is given by (where g is the acceleration due to gravity, a is the area of orifice and C_d is the coefficient of discharge):



Ans

✗ 1. $\frac{15C_d a\sqrt{2g}}{14\pi R^{5/2}}$

✓ 2. $\frac{14\pi R^{5/2}}{15C_d a\sqrt{2g}}$

✗ 3. $\frac{14C_d a\sqrt{2g}}{15\pi R^{5/2}}$

✗ 4. $\frac{15\pi R^{5/2}}{14C_d a\sqrt{2g}}$

Question ID : **63068075041**
Chosen Option : **4**

Q.50 **A shaft runs at 80 rpm and drives another shaft at 150 rpm through belt drive. If the diameter of the driving pully is 600 mm, the diameter of the driven pulley is (neglect the belt thickness):**

Ans

✗ 1. 1125 mm

✗ 2. 850 mm

✓ 3. 320 mm

✗ 4. 520 mm

Question ID : **63068074943**
Chosen Option : **3**

Q.51 **In frictionless flow, with no work or heat transfer, the energy grade line:**

Ans

✓ 1. has constant height

✗ 2. linearly decreases

✗ 3. first increases then decreases

✗ 4. linearly increases

Question ID : **63068075057**
Chosen Option : **1**

Q.52 **Which of the following statements is NOT true about a triangular weir?**

Ans

✗ 1. For measuring low discharges, a triangular weir or notch is more useful as compared to a rectangular weir.

✗ 2. In most of the cases of flow over a triangular weir or notch, the velocity of approach may be neglected without introducing an appreciable error.

✓ 3. Ventilation of a triangular weir is must.

✗ 4. The nappe emerging from a triangular weir or notch has the same shape for nearly all different heads.

Question ID : **63068075046**
Chosen Option : **3**

Q.53 **Section modulus (Z) of a beam in simple bending is (where M = bending moment, = second moment of area, σ = longitudinal stress):**

Ans

✗ 1. $Z = \frac{\sigma}{M}$

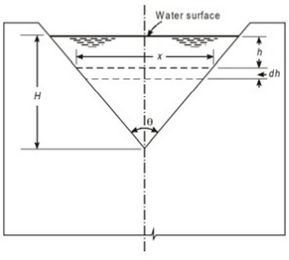
✓ 2. $Z = \frac{M}{\sigma}$

✗ 3. $Z = \frac{M}{I}$

✗ 4. $Z = \frac{I}{M}$

Question ID : **63068074972**
Chosen Option : **2**

Q.54 For flow over the triangular notch shown in the following figure, constant for the notch is given by (where C_d is the coefficient of discharge, and g is the acceleration due to gravity):



Ans

✗ 1. $\frac{8}{15} C_d \sqrt{2g} \sin\frac{\theta}{2}$

✗ 2. $\frac{15}{8} C_d \sqrt{2g} \tan\frac{\theta}{2}$

✓ 3. $\frac{8}{15} C_d \sqrt{2g} \tan\frac{\theta}{2}$

✗ 4. $\frac{15}{8} C_d \sqrt{2g} \sin\frac{\theta}{2}$

Question ID : **63068075045**
Chosen Option : **3**

Q.55 The relationship between Poisson's ratio (γ), bulk modulus of elasticity (K) and modulus of rigidity (G) is:

Ans

✗ 1. $\gamma = \frac{(3K + 2G)}{2(G - 3K)}$

✗ 2. $\gamma = \frac{2(G - 3K)}{(3K + 2G)}$

✓ 3. $\gamma = \frac{(3K - 2G)}{2(G + 3K)}$

✗ 4. $\gamma = \frac{2(G + 3K)}{(3K - 2G)}$

Question ID : **63068074953**
Chosen Option : **3**

Q.56 **Variation in bending moment in a cantilever beam, carrying a load, the intensity of which varies uniformly from zero at the free end to w per unit run at the fixed end, is governed by the _____.**

Ans
✗ 1. Quartic Law
✗ 2. Linear Law
✗ 3. Parabolic Law
✓ 4. Cubic Law

Question ID : **63068074977**
Chosen Option : **4**

Q.57 **Which of the following is NOT a constriction meter?**

Ans
✗ 1. Venturi tube
✗ 2. Flow nozzle
✓ 3. Rotameter
✗ 4. Thin-plate orifice

Question ID : **63068075031**
Chosen Option : **--**

Q.58 **The dimensions of specific weight are same as that of:**

Ans
✗ 1. density
✗ 2. pressure
✗ 3. work/volume
✓ 4. force/volume

Question ID : **63068075009**
Chosen Option : **4**

Q.59 **Which of the following statements is NOT true about pure bending in beams?**

Ans
✓ 1. Shear stress is present in the beam.
✗ 2. Outer edge of cross-section of the beam undergoes tension.
✗ 3. Inner edge of cross-section of the beam undergoes compression.
✗ 4. Internal stresses are present along the length of the beam.

Question ID : **63068074969**
Chosen Option : **1**

Q.60 **Based on the two statements given below, choose the correct answer.**

Statement A: The magnitude of the resultant fluid force is equal to the pressure acting at the centroid of the area multiplied by the total area.

Statement B: The resultant fluid force, acting on a fully submerged inclined plane surface, does not pass through the centroid of the area.

Ans
✗ 1. Statement A is correct but statement B is incorrect.
✗ 2. Statement A is incorrect but statement B is correct.
✗ 3. Both statements A and B are incorrect.
✓ 4. Both statements A and B are correct.

Question ID : **63068075021**
Chosen Option : **3**

Q.61 **Variation in shear force in a cantilever beam, carrying a load, the intensity of which varies uniformly from zero at the free end to w per unit run at the fixed end, is governed by the _____.**

Ans
✗ 1. Quartic Law
✗ 2. Linear Law
✗ 3. Cubic Law
✓ 4. Parabolic Law

Question ID : **63068074978**
Chosen Option : **4**

Q.62 **The force, F, generated when a jet strikes at the middle of one of the flat plates mounted on a wheel is (where V is the jet velocity and u is the tangential velocity of the wheel at the middle of the plate, D is the diameter of the wheel at the middle of the plate and A is the area of the plate):**

Ans
✓ 1. $F = \rho A V (V-u)$
✗ 2. $F = \rho A V u$
✗ 3. $F = \rho A V^2$
✗ 4. $F = \rho A u^2$

Question ID : **63068075069**
Chosen Option : **1**

Q.63 **A 120-mm-wide and 10-mm-thick steel plate is bent into circular arc of 8-m radius. The maximum value of stress produced is (take Young's Modulus of Rigidity, E, = 200 GPa):**

Ans
✗ 1. 12.5 Mpa
✓ 2. 125 Mpa
✗ 3. 250 MPa
✗ 4. 25 Mpa

Question ID : **63068074974**
Chosen Option : **2**

Q.64 **A riveted joint formed between two plates, when they are brought face to face such that an overlap exists, is called a _____.**

Ans
✗ 1. tee joint
✗ 2. butt joint
✗ 3. edge joint
✓ 4. lap joint

Question ID : **63068074956**
Chosen Option : **4**

Q.65 The power available at the outlet of a pipe is (where Q is the discharge through the pipe, V is the velocity of flow, L and D are the length and the diameter of the pipe, respectively, w is the specific weight, f is the friction factor and g is the acceleration due to gravity):

Ans

✗ 1. $w\left(\frac{\pi D^3}{2L}\times V\right)\left(H-\frac{fLV^2}{2gD}\right)$

✓ 2. $w\left(\frac{\pi D^2}{4}\times V\right)\left(H-\frac{fLV^2}{2gD}\right)$

✗ 3. $w\left(\frac{\pi D^2}{2}\times V\right)\left(H-\frac{fLV^2}{2gD}\right)$

✗ 4. $w\left(\frac{\pi D^3}{4L}\times V\right)\left(H-\frac{fLV^2}{2gD}\right)$

Question ID : **63068075063**
Chosen Option : **2**

Q.66 Euler's Crippling Load for a column with both ends fixed is _____ that for a column fixed at one end with the other end hinged.

Ans

✗ 1. half of

✗ 2. the same as

✓ 3. double of

✗ 4. triple of

Question ID : **63068075003**
Chosen Option : **3**

Q.67 Uniformly varying load on a beam is also known as:

Ans

✗ 1. sinusoidal load

✓ 2. triangular load

✗ 3. unequal load

✗ 4. concentrated load

Question ID : **63068074962**
Chosen Option : **2**

Q.68 A plate, 100 mm wide and 10 mm thick, is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 kN. The length of weld (neglecting allowance), if the permissible shear stress in the weld does not exceed 55 MPa, is:

Ans

✗ 1. 115.5 cm

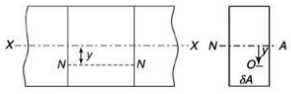
✗ 2. 115.5 mm

✓ 3. 103 mm

✗ 4. 103 cm

Question ID : **63068074960**
Chosen Option : **2**

Q.69 The longitudinal stress (σ) for the section of beam (*N-N*) shown in the following figure, subjected to simple bending having moment M, is given by the formula (where E = Young's modulus of rigidity, I = second moment of area):



Ans

✔ 1. $\sigma = \frac{M}{I}y$

✘ 2. $\sigma = \frac{I}{M}y$

✘ 3. $\sigma = \frac{MI}{y}$

✘ 4. $\sigma = \frac{y}{MI}$

Question ID : **63068074971**
Chosen Option : **1**

Q.70 In a loaded beam, the point where the bending moment is zero is known as:

Ans

✘ 1. the zero point

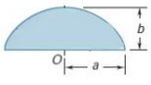
✔ 2. the contraflexure point

✘ 3. the Unwin point

✘ 4. the bottom point

Question ID : **63068074964**
Chosen Option : **2**

Q.71 The coordinates of the centre of gravity (x, y) of the semi-elliptical area shown in the given figure, with respect to the origin *O*, are:



Ans

✔ 1. $(0, \frac{4b}{3\pi})$

✘ 2. $(\frac{4a}{3\pi}, \frac{4b}{3\pi})$

✘ 3. $(0, \frac{4a}{3\pi})$

✘ 4. $(\frac{4b}{3\pi}, \frac{4a}{3\pi})$

Question ID : **63068074944**
Chosen Option : **1**

Q.72 In a column, what is the relationship between the slenderness ratio and the critical stress?

Ans

✔ 1. Slenderness ratio decreases with the increase in critical stress.

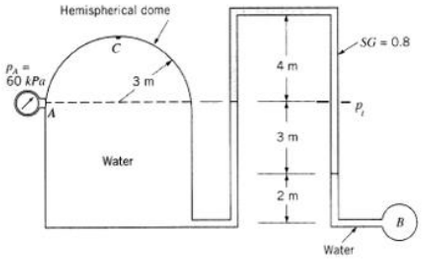
✘ 2. Slenderness ratio increases with the increase in critical stress.

✘ 3. Slenderness ratio first increases and after a maximum value, starts to decrease, with the increase in critical stress.

✘ 4. Slenderness ratio remains constant with the increase in critical stress.

Question ID : **63068075005**
Chosen Option : **1**

Q.73 With reference to the given figure, if p represents pressure, which of the following is correct?



Ans

✗ 1. $p_A = p_1 - p_B$

✗ 2. $p_A < p_1$

✓ 3. $p_A = p_1$

✗ 4. $p_A > p_1$

Question ID : **63068075017**
Chosen Option : **3**

Q.74 **The efficiency, η, of the Screw Jack is given by (where α is the helix angle and φ is the angle of friction):**

Ans

✗ 1. $\eta = \frac{\tan(\alpha - \varphi)}{\tan \alpha}$

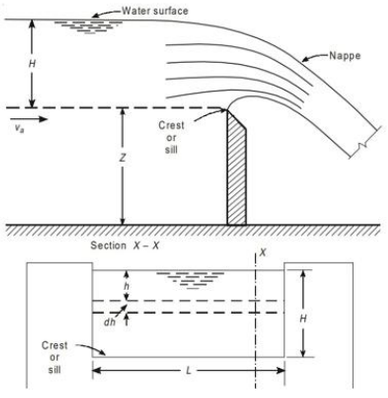
✗ 2. $\eta = \frac{\tan(\alpha + \varphi)}{\tan \alpha}$

✓ 3. $\eta = \frac{\tan \alpha}{\tan(\alpha + \varphi)}$

✗ 4. $\eta = \frac{\tan \alpha}{\tan(\alpha - \varphi)}$

Question ID : **63068074947**
Chosen Option : **2**

Q.75 The discharge Q passing over the rectangular notch shown in the following figure is given by (where C_d is the coefficient of discharge, h_a is the approach velocity based head and g is the acceleration due to gravity):



Ans

✗ 1. $Q = \frac{3}{2} C_d \sqrt{2g} L \left[(H + h_a)^{2/3} - h_a^{2/3} \right]$

✓ 2. $Q = \frac{2}{3} C_d \sqrt{2g} L \left[(H + h_a)^{3/2} - h_a^{3/2} \right]$

✗ 3. $Q = C_d \sqrt{2g} L \left[(H + h_a)^{3/2} - h_a^{3/2} \right]$

✗ 4. $Q = \frac{2}{3} C_d \sqrt{2g} L \left[(H + h_a)^{2/3} - h_a^{2/3} \right]$

Question ID : **63068075043**
Chosen Option : **2**

Q.76 Which of the following statements is correct about the density of water?

Ans

✗ 1. Density of water is maximum at 0 °C.

✗ 2. Density of water decreases with temperature.

✗ 3. Density of water increases with temperature.

✓ 4. Density of water is maximum at 4 °C.

Question ID : **63068075010**
Chosen Option : **4**

Q.77 Any two points at _____ elevation in a continuous mass of the same static fluid will be at _____ pressure(s).

Ans

✓ 1. the same; the same

✗ 2. the same; different

✗ 3. the same; absolute

✗ 4. different; the same

Question ID : **63068075016**
Chosen Option : **1**

Q.78 **Water discharges at the rate of 98 litres per second through a vertical sharp-edged orifice of area 0.01 m^2 placed under a constant head of 10 m. A point on the jet measured from the vena contracta of the jet has coordinates 3.85 m horizontal and 0.4 m vertical. The value of coefficient of contraction is (take acceleration due to gravity as 10 m/s^2):**

Ans
✗ 1. 0.63
✗ 2. 0.78
✗ 3. 0.96
✓ 4. 0.73

Question ID : **63068075038**
Chosen Option : **4**

Q.79 The torsional stiffness is given by (ℓ = length of shaft, J = polar moment of inertia, G = modulus of rigidity):

Ans
✗ 1. $\frac{J}{G\ell}$
✓ 2. $\frac{JG}{\ell}$
✗ 3. $\frac{G}{J\ell}$
✗ 4. $\frac{\ell}{JG}$

Question ID : **63068074994**
Chosen Option : **2**

Q.80 **Power coefficient C_P of a turbine is (where bhp = available power, D = impeller diameter, ρ = fluid density, n = shaft speed):**

Ans
✓ 1. $\frac{bhp}{\rho n^3 D^5}$
✗ 2. $\frac{bhp}{\rho n^5 D^3}$
✗ 3. $\frac{\rho n^3 D^5}{bhp}$
✗ 4. $\frac{\rho n^5 D^3}{bhp}$

Question ID : **63068075075**
Chosen Option : **1**

Q.81 **The variation of shear stress in a circular shaft, subjected to torsion, with radial distance is:**

Ans
✗ 1. parabolic
✗ 2. hyperbolic
✓ 3. linear
✗ 4. quartic

Question ID : **63068074988**
Chosen Option : **3**

Q.82 **The maximum shear stress of a solid shaft is given by (where T = Torque, d = shaft diameter):**

Ans

✗ 1. $\frac{16T}{\pi d^2}$

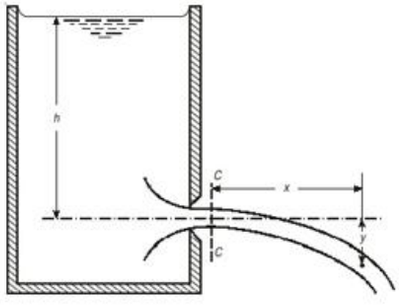
✓ 2. $\frac{16T}{\pi d^3}$

✗ 3. $\frac{16T}{\pi d}$

✗ 4. $\frac{16T}{\pi d^4}$

Question ID : **63068074991**
Chosen Option : **2**

Q.83 In reference to the following figure, the coefficient of velocity is given by:



Ans

✗ 1. $\sqrt{\frac{y}{4hx^2}}$

✗ 2. $\sqrt{\frac{x}{4hy^2}}$

✗ 3. $\sqrt{\frac{y^2}{4hx}}$

✓ 4. $\sqrt{\frac{x^2}{4hy}}$

Question ID : **63068075036**
Chosen Option : **4**

Q.84 **What is the correct relationship of loss coefficients (K) for 90° bends with pipe bend radius (R) to pipe diameter (d) ratio?**

Ans

✓ 1. K first decreases till a certain value and then increases with increase in R/d

✗ 2. K decreases with increase in R/d

✗ 3. K first increases till a certain value and then decreases with increase in R/d

✗ 4. K increases with increase in R/d

Question ID : **63068075052**
Chosen Option : **--**

Q.85 **Darcy–Weisbach equation used for computing the loss of head due to friction (h_f) in pipes is given by (where V is the velocity of flow, L and D are the length and diameter of the pipe, respectively, f is the friction factor and g is the acceleration due to gravity):**

Ans

✗ 1. $h_f = \frac{\sqrt{2gD}}{fLV}$

✗ 2. $h_f = \frac{fLV}{\sqrt{2gD}}$

✓ 3. $h_f = \frac{fLV^2}{2gD}$

✗ 4. $h_f = \frac{2gD}{fLV^2}$

Question ID : **63068075049**
Chosen Option : **3**

Q.86 **The relation between force F and jet velocity V, for a high-velocity jet impinging on a stationary flat vertical plate (neglecting friction), is:**

Ans

✗ 1. $F \propto V^{1/2}$

✓ 2. $F \propto V^2$

✗ 3. $F \propto V^{3/2}$

✗ 4. $F \propto V^3$

Question ID : **63068075067**
Chosen Option : **2**

Q.87 **The ratio of the equivalent length of a column fixed at one end with the other free to that of a column with both ends hinged is (consider the lengths of the two columns to be the same):**

Ans

✗ 1. 1 : 2

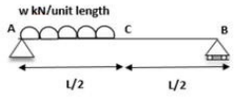
✗ 2. 1 : 1

✗ 3. 3 : 1

✓ 4. 2 : 1

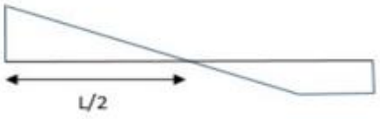
Question ID : **63068075002**
Chosen Option : **4**

Q.88 A simply supported beam has span L as shown in the following figure. Point C is the centre of the beam. It is subjected to UDL, w/unit length, in the portion A to C. Which of the following is the SFD for the beam?



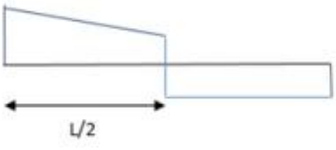
Ans

✗ 1.



✗ 2.

✗ 3.



✓ 4.

Question ID : **63068074966**
Chosen Option : **4**

Q.89 Which riveted joint has the highest efficiency, which is expressed in percentile of the commercial boiler joint?

Ans

✗ 1. Double riveted butt joint

✗ 2. Double riveted lap joint

✓ 3. Triple riveted butt joint

✗ 4. Triple riveted lap joint

Question ID : **63068074957**
Chosen Option : **--**

Q.90 The water from a reservoir at a high altitude is conveyed by a pipeline. The efficiency of power transmission in this case is given by (where Q is the volume flow rate, R is the hydraulic resistance of the pipeline and H is the potential head of water in the reservoir):

Ans

✗ 1. $\eta_P = 1 - \frac{H}{RQ^2}$

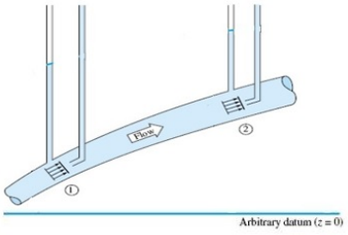
✗ 2. $\eta_P = 1 - \frac{H^2}{RQ^3}$

✗ 3. $\eta_P = 1 - \frac{RQ^3}{H^2}$

✓ 4. $\eta_P = 1 - \frac{RQ^2}{H}$

Question ID : **63068075064**
Chosen Option : **4**

Q.91 The hydraulic grade line (HGL) and the energy grade line (EGL) for a frictionless flow in the duct shown in the following figure are _____, respectively.



Ans

✔ 1. of gradually increasing height and straight

✗ 2. of gradually increasing height and gradually increasing height

✗ 3. straight and straight

✗ 4. of gradually decreasing height and straight

Question ID : **63068075062**
Chosen Option : **--**

Q.92 Two plates, 200 mm wide and 10 mm thick, are to be welded by means of transverse welds at the ends. If the plates are subjected to a load of 70 kN, the size of the weld (neglecting allowance), assuming the allowable tensile stress of 70 MPa, is:

Ans

✗ 1. 153.92 mm

✔ 2. 141.42 mm

✗ 3. 141.42 cm

✗ 4. 153.92 cm

Question ID : **63068074961**
Chosen Option : **2**

Q.93 The relationship between Young's modulus of rigidity (E), bulk modulus of elasticity (K) and modulus of rigidity (G) is:

Ans

✗ 1. $E = \frac{(3K + G)}{9GK}$

✗ 2. $E = \frac{(3K + 2G)}{3GK}$

✔ 3. $E = \frac{9GK}{(3K+G)}$

✗ 4. $E = \frac{3GK}{(3K+2G)}$

Question ID : **63068074952**
Chosen Option : **3**

Q.94 Perry's approximate formula is (where σ_{max}= maximum compressive stress, $\sigma_o = \frac{P}{A}$, $\sigma_e = \frac{P_e}{A}$,

e = eccentricity, y_c = distance of the extreme compressive fibre from the neutral axis, k = radius of gyration,

P = Rankine's crippling load, P_e = Euler's crippling load, A = area):

Ans

✗ 1. $\left(\frac{\sigma_{max}}{\sigma_o}-1\right)\left(\frac{\sigma_o}{\sigma_e}-1\right)=\frac{(1.2e)y_c}{k^2}$

✓ 2. $\left(\frac{\sigma_{max}}{\sigma_o}-1\right)\left(1-\frac{\sigma_o}{\sigma_e}\right)=\frac{(1.2e)y_c}{k^2}$

✗ 3. $\left(1-\frac{\sigma_{max}}{\sigma_o}\right)\left(1-\frac{\sigma_o}{\sigma_e}\right)=\frac{(1.2e)y_c}{k^2}$

✗ 4. $\left(\frac{\sigma_{max}}{\sigma_o}+1\right)\left(1+\frac{\sigma_o}{\sigma_e}\right)=\frac{(1.2e)y_c}{k^2}$

Question ID : **63068075004**
Chosen Option : **--**

Q.95 Which of the following losses occurring in pipe flow does NOT belong to the category of minor loss?

Ans

✓ 1. Frictional loss in pipes

✗ 2. Loss in bends

✗ 3. Loss in flow through valves, open or partially closed

✗ 4. Loss in sudden expansion

Question ID : **63068075050**
Chosen Option : **1**

Q.96 The actual discharge (Q) through an orifice, attached to a tank, is given by (where V is the flow velocity from the orifice, a_c is the area of contraction, a is the orifice area, h is the height of the fluid in the tank, C_c is the coefficient of contraction, C_v is the coefficient of velocity and g is the acceleration due to gravity):

Ans

✗ 1. $Q=(a\times V)$

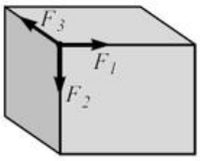
✗ 2. $Q=a\sqrt{2gh}$

✗ 3. $Q=(C_c\times a_c)\times(C_v\sqrt{2gh})$

✓ 4. $Q=(C_c\times a)\times(C_v\sqrt{2gh})$

Question ID : **63068075035**
Chosen Option : **3**

Q.97 The system of forces represented in the following figure is the _____.



Ans
- ✔ 1. non-coplanar concurrent force system
- ✘ 2. non-coplanar non-concurrent force system
- ✘ 3. coplanar non-concurrent force system
- ✘ 4. coplanar concurrent force system

Question ID : **63068074937**
Chosen Option : **1**

Q.98 **_____ is the ratio of dynamic viscosity to kinematic viscosity.**

Ans
- ✘ 1. Specific weight
- ✘ 2. Specific volume
- ✔ 3. Density
- ✘ 4. Virtual viscosity

Question ID : **63068075008**
Chosen Option : **3**

Q.99 **In pipe flows, the minor loss coefficient, K, and the Darcy friction factor, f, are related by the equation (where L_{eq} is the pipe equivalent length and d is the pipe diameter):**

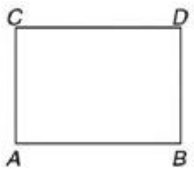
Ans
- ✘ 1. $L_{eq} = \left(\frac{K}{f}\right)^{1/2} d$
- ✘ 2. $L_{eq} = \left(\frac{K}{f}\right)^{2} d$
- ✔ 3. $L_{eq} = \frac{Kd}{f}$
- ✘ 4. $L_{eq} = \left(\frac{K}{f}\right)^{1/3} d$

Question ID : **63068075051**
Chosen Option : **3**

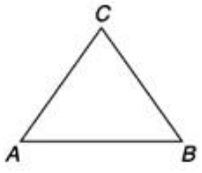
Q.100 Which of the following is a deficiency frame?

Ans

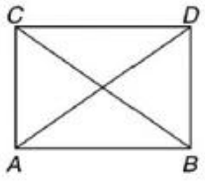
✔ 1.



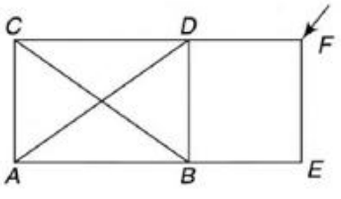
✘ 2.



✘ 3.

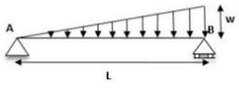


✘ 4.



Question ID : **63068074984**
Chosen Option : **4**

Q.101 For the simply supported beam shown in the following figure, at what distance from the support A is the shear force zero?



Ans

✘ 1. L/2

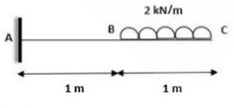
✘ 2. L/3

✘ 3. L/4

✔ 4. $L/\sqrt{3}$

Question ID : **63068074968**
Chosen Option : **4**

Q.102 A cantilever beam is loaded as shown in the following figure. What is the shape of the bending moment diagram for portion AB?



Ans

✘ 1. Linearly varying with maximum bending moment at B

✔ 2. Linearly varying with maximum bending moment at A

✘ 3. Parabolic

✘ 4. Constant bending moment from A to B

Question ID : **63068074967**
Chosen Option : **2**

Q.103 The resultant of any two _____ forces may be found by the Parallelogram Law.

Ans

✗ 1. collinear non-concurrent

✗ 2. non-collinear non-concurrent

✗ 3. collinear concurrent

✓ 4. non-collinear concurrent

Question ID : **63068074939**
Chosen Option : **4**

Q.104 Head coefficient C_H of a turbine is (where H = head, D = impeller diameter, g = acceleration due to gravity, n = shaft speed):

Ans

✓ 1. $\frac{gH}{n^2D^2}$

✗ 2. $\frac{gH^2}{n^3D^3}$

✗ 3. $\frac{n^2D^2}{gH}$

✗ 4. $\frac{n^3D^3}{gH^2}$

Question ID : **63068075074**
Chosen Option : **1**

Q.105 For a fluid flowing through a centrifugal pump having density ρ, discharge Q, circumferential speed u_1, tip speed u_2, and absolute circumferential velocity components of the flow V_{t1} and V_{t2}, the power delivered to the fluid is given by:

Ans

✗ 1. $\rho Q(u_2V_{t1} - u_1V_{t2})$

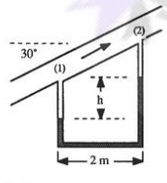
✓ 2. $\rho Q(u_2V_{t2} - u_1V_{t1})$

✗ 3. $\rho Q(u_1V_{t2} - u_2V_{t1})$

✗ 4. $\rho Q(u_1V_{t1} - u_2V_{t2})$

Question ID : **63068075084**
Chosen Option : **4**

Q.106 Water flows upward in a pipe slanted at 30°, as shown in the given figure. If the mercury manometer reads h = 12 cm, the pressure difference between points (1) and (2) in the pipe is (take specific weights of water as 9790 N/m^3 and of mercury as 133100 N/m^3):



Ans

✗ 1. 2.4 kPa

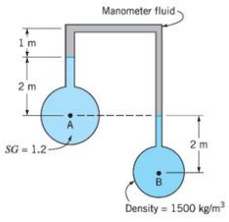
✗ 2. 34.4 kPa

✓ 3. 26.1 kPa

✗ 4. 16.0 kPa

Question ID : **63068075018**
Chosen Option : **4**

Q.107 For the stationary fluid shown in the following figure, if the pressure at point B is 20 kPa greater than that at point A, the specific weight of the manometer fluid is (take specific weight of water as 9810 N/m^3 and acceleration due to gravity as 9.81 m/s^2):



Ans

✗ 1. 16.5 kN/m^3

✓ 2. 7.1 kN/m^3

✗ 3. 7.1 N/m^3

✗ 4. 16.5N/m^3

Question ID : **63068075019**
Chosen Option : **2**

Q.108 If the atmospheric pressure is neglected, the coordinates for the centre of pressure (x_{CP}, y_{CP}) for a fully submerged inclined plane surface is (where I_{xx} is the area moment of inertia of the plate area about its centroidal x axis, I_{xy} is the product of inertia of the plane surface, θ is the angle of inclination of the plane surface, h_{CG} is the depth straight down from the surface to the plate centroid, A is the area of plane surface):

Ans

✗ 1. $x_{CP} = \frac{I_{xy}\sin\theta}{h_{CG}A}, \quad y_{CP} = \frac{I_{xx}\cos\theta}{h_{CG}A}$

✗ 2. $x_{CP} = \frac{I_{xx}\cos\theta}{h_{CG}A}, \quad y_{CP} = \frac{I_{xy}\sin\theta}{h_{CG}A}$

✓ 3. $x_{CP} = \frac{I_{xy}\sin\theta}{h_{CG}A}, \quad y_{CP} = \frac{I_{xx}\sin\theta}{h_{CG}A}$

✗ 4. $x_{CP} = \frac{I_{xx}\sin\theta}{h_{CG}A}, \quad y_{CP} = \frac{I_{xy}\sin\theta}{h_{CG}A}$

Question ID : **63068075022**
Chosen Option : **3**

Q.109 The pipe-head loss is equal to the change in the _____.

Ans

✗ 1. pressure head only

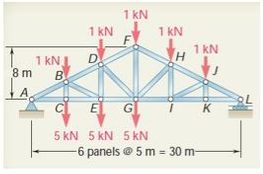
✗ 2. velocity head only

✗ 3. gravity head only

✓ 4. height of the hydraulic grade line

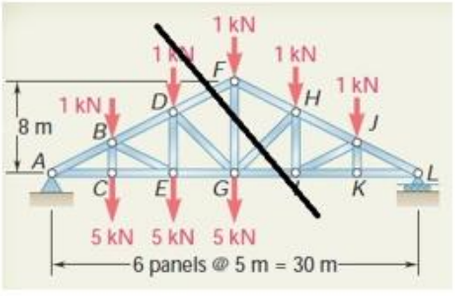
Question ID : **63068075056**
Chosen Option : **4**

Q.110 To determine the force in members FH, GH and GI of the truss shown in the following figure, using the method of sections, the correct way to draw the section will be:

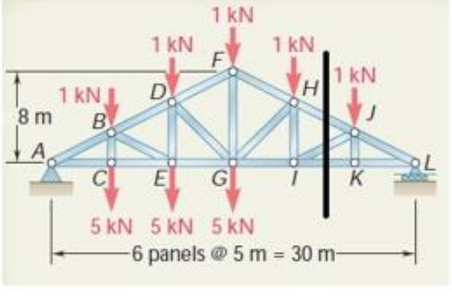


Ans

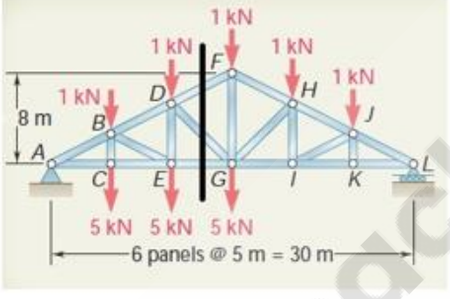
✗ 1.



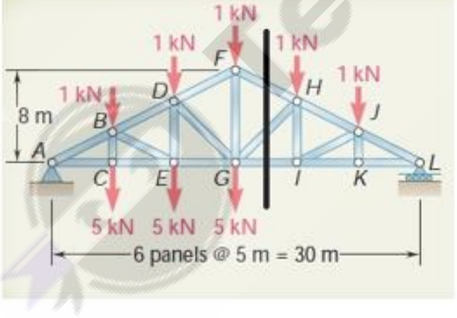
✗ 2.



✗ 3.



✓ 4.



Question ID : **63068074987**
Chosen Option : **4**

Q.111 The efficiency of power transmission through a pipe, at the condition of maximum power delivered, is (where H is the total head supplied at the entrance to the pipe and hf is the loss of head due to friction):

Ans

✓ 1. 2/3

✗ 2. 1/4

✗ 3. 1/2

✗ 4. 1/3

Question ID : **63068075065**
Chosen Option : **1**

Q.112 Which of the following assumptions for the Bernoulli equation $\frac{p}{\rho}+\frac{v^2}{2}+gz=\text{constant}$, is NOT correct?

Ans
✗ 1. Flow is incompressible.
✗ 2. Flow is steady.
✗ 3. Flow is along single streamline.
✓ 4. Flow is viscous.

Question ID : **63068075029**
Chosen Option : **4**

Q.113 The variation of bending moment due a point load on a simply supported beam is governed by the _____.

Ans
✗ 1. Parabolic Law
✗ 2. Cubic Law
✗ 3. Quartic Law
✓ 4. Linear Law

Question ID : **63068074975**
Chosen Option : **1**

Q.114 Francis formula for the discharge over a rectangular weir neglecting the approach velocity is (where H and L are the height and width of the weir, respectively, and n is the number of end contractions for the weir):

Ans
✗ 1. $Q=2.84(L-0.1(nH))H^{2/3}$
✓ 2. $Q=1.84(L-0.1(nH))H^{3/2}$
✗ 3. $Q=1.84(L-0.1(nH))H^{2/3}$
✗ 4. $Q=2.84(L-0.1(nH))H^{3/2}$

Question ID : **63068075044**
Chosen Option : **2**

Q.115 For a centrifugal pump, the ratio of the power available at the impeller to the power available at the shaft of the pump is known as:

Ans
✗ 1. overall efficiency
✗ 2. hydraulic efficiency
✓ 3. mechanical efficiency
✗ 4. volumetric efficiency

Question ID : **63068075078**
Chosen Option : **3**

Q.116 Which of the following statements is NOT correct about flow streamlines?

Ans
✓ 1. The component of weight along a streamline does not depend on the streamline angle.
✗ 2. The lines that are tangent to the velocity vectors throughout the flow field are called streamlines.
✗ 3. Fluid particles accelerate along streamlines.
✗ 4. Fluid particles accelerate normal to streamlines.

Question ID : **63068075027**
Chosen Option : **4**

Q.117 **A rod is 2 m long at a temperature of 10 °C. The temperature of it is raised to 80 °C. If the expansion due to temperature rise is prevented, the stress developed in the rod is (take Young's modulus of rigidity, E, = 1.0 × 10^5 MN/m^2 and coefficient of thermal expansion, α, = 0.000012 per °C):**

Ans

✗ 1. 84 kN/mm^2

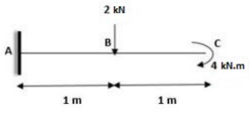
✗ 2. 64 kN/mm^2

✗ 3. 64 N/mm^2

✓ 4. 84 N/mm^2

Question ID : **63068074954**
Chosen Option : **1**

Q.118 A cantilever beam AB carries loading as shown in the following figure. Which of the following is the SFD for the beam?



Ans

✗ 1.


✗ 2.


✗ 3.


✓ 4.


Question ID : **63068074965**
Chosen Option : **4**

Q.119 **For gradual conical expansion from a pipe of diameter d_1 to a pipe of diameter d_2, the loss coefficient K is (where C_P is the pressure-recovery coefficient):**

Ans

✗ 1. $K = 1 - \frac{d_1}{d_2} - C_p$

✗ 2. $K = 1 - \frac{d_1^2}{d_2^2} - C_p$

✗ 3. $K = C_p - \frac{d_1^4}{d_2^4}$

✓ 4. $K = 1 - \frac{d_1^4}{d_2^4} - C_p$

Question ID : **63068075055**
Chosen Option : **--**

Q.120 Neglecting the effect of internal pressure, the volumetric strain of a thin cylinder is (σ = hoop stress, E = Young's modulus, v = Poisson's ratio):

Ans

✗ 1. $\frac{\sigma}{E}(2.5-\nu)$

✓ 2. $\frac{\sigma}{E}(2.5-2\nu)$

✗ 3. $\frac{\sigma}{E}(1.5-2\nu)$

✗ 4. $\frac{\sigma}{E}(1.5-\nu)$

Question ID : **63068075000**
Chosen Option : **2**

Q.121 The relation governing the torsional torque in circular shafts is (where T = Torque, τ = shear stress, r = radial distance, ℓ = length of shaft, J = polar moment of inertia, G = modulus of rigidity, θ = angle of twist):

Ans

✗ 1. $\frac{T}{\ell}=\frac{\tau}{r}=\frac{G\theta}{J}$

✗ 2. $\frac{T}{J}=\frac{\tau}{\ell}=\frac{G\theta}{r}$

✓ 3. $\frac{T}{J}=\frac{\tau}{r}=\frac{G\theta}{\ell}$

✗ 4. $\frac{T}{r}=\frac{\tau}{\ell}=\frac{G\theta}{J}$

Question ID : **63068074989**
Chosen Option : **3**

Q.122 Which of the following statements is NOT correct about gauge pressure?

Ans

✗ 1. For a pressure value less than atmospheric pressure, gauge pressure will be negative.

✗ 2. It can have negative values.

✓ 3. It can be more than absolute pressure.

✗ 4. For a pressure value more than atmospheric pressure, gauge pressure will be positive.

Question ID : **63068075014**
Chosen Option : **3**

Q.123 A planet, having mass and radius half of that of earth, will have a value of acceleration due to gravity _____ that on earth (assume that constant of gravitation is the same for both the planets).

Ans

✓ 1. double

✗ 2. half of

✗ 3. the same as

✗ 4. four times

Question ID : **63068074938**
Chosen Option : **1**

Q.124 The efficiency of a typical centrifugal pump is maximum at:

Ans

✗ 1. maximum discharge

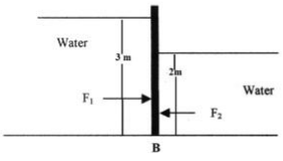
✗ 2. zero discharge

✗ 3. 40% of maximum discharge

✓ 4. 60% of maximum discharge

Question ID : **63068075081**
Chosen Option : **1**

Q.125 A vertical lock gate is 4 m wide and separates water levels of 2 m and 3 m, respectively, as shown in the following figure. The moment about the bottom required to keep the gate stationary is (take specific weight of water as 9790 N/m^3):



Ans

✗ 1. 104 kN.m

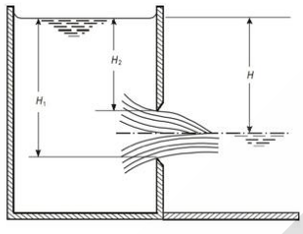
✗ 2. 134 kN.m

✗ 3. 114 kN.m

✓ 4. 124 kN.m

Question ID : **63068075024**
Chosen Option : **2**

Q.126 In reference to the following figure, the total discharge, Q, through the partially submerged orifice is given by (where C_{d1} and C_{d2} represents the coefficients of discharge for the free portion and submerged portion of the orifice, respectively, and the breadth of the orifice is b):



Ans

✗ 1. $Q = \frac{2}{3} C_{d1} b \sqrt{2g} \{H_1 - H\} + C_{d2} b \left(H^{3/2} - H_2^{3/2}\right) \sqrt{2gH}$

✓ 2. $Q = \frac{2}{3} C_{d1} b \sqrt{2g} \left\{H^{3/2} - H_2^{3/2}\right\} + C_{d2} b (H_1 - H) \sqrt{2gH}$

✗ 3. $Q = C_{d1} b \sqrt{2g} \left\{H^{3/2} - H_2^{3/2}\right\} + \frac{2}{3} C_{d2} b (H_1 - H) \sqrt{2gH}$

✗ 4. $Q = \frac{2}{3} C_{d1} b \sqrt{2gH} \left\{H^{3/2} - H_2^{3/2}\right\} + C_{d2} b (H_1 - H) \sqrt{2g}$

Question ID : **63068075037**
Chosen Option : **2**

Q.127 If the actual velocity in the contracted section of a jet of liquid flowing from a 50-mm-diameter orifice is 8.91 m/s under a head of 5 m, the value of the coefficient of velocity will be (take acceleration due to gravity as 10 m/s^2):

Ans

✔ 1. 0.891

✘ 2. 0.861

✘ 3. 0.821

✘ 4. 0.901

Question ID : **63068075033**
Chosen Option : **1**

Q.128 The basic symbol used for the single V-butt weld joint is:

Ans

✘ 1. 

✘ 2. 

✔ 3. 

✘ 4. 

Question ID : **63068074959**
Chosen Option : **3**

Q.129 If the line of action of all the forces in the system lies on the same plane, then it is called a _____.

Ans

✘ 1. parallel force system

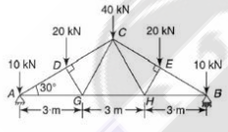
✘ 2. non-coplanar force system

✘ 3. concurrent force system

✔ 4. coplanar force system

Question ID : **63068074936**
Chosen Option : **4**

Q.130 The force in member AD of the truss shown in the following figure is (take D and E as the mid-points of AC and BC, respectively):



Ans

✘ 1. 120 kN

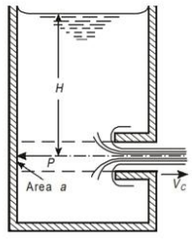
✘ 2. 80 KN

✔ 3. –80 kN

✘ 4. –120 kN

Question ID : **63068074986**
Chosen Option : **3**

Q.131 In a Borda's mouthpiece as shown in the following figure, 40 mm diameter discharges under a constant head of 1.5 m. If the coefficient of velocity for the entrance section of the mouthpiece is 0.95, the coefficient of contraction, when the mouthpiece is running free, is:



Ans
✗ 1. 0.59
✓ 2. 0.554
✗ 3. 0.68
✗ 4. 0.63

Question ID : **63068075042**
Chosen Option : **--**

Q.132 The relationship between the Engineering Stress (s) and the True Stress (σ), for materials with no changes in volume during deformation, is (where e is the Engineering Strain and ε is the True Strain):

Ans
✗ 1. $s= \sigma(\varepsilon + 1)$
✗ 2. $\sigma = s(e - 1)$
✓ 3. $\sigma = s(e + 1)$
✗ 4. $s= \sigma(\varepsilon - 1)$

Question ID : **63068074951**
Chosen Option : **1**

Q.133 Based on the two statements given below, choose the correct answer.

Statement A: Reaction turbines are low-head, high-flow devices.

Statement B: In a reaction turbine, flow enters at the larger-diameter section and discharges through the eye.

Ans
✗ 1. Both statements A and B are incorrect.
✗ 2. Statement A is incorrect, but statement B is correct.
✓ 3. Both statements A and B are correct.
✗ 4. Statement A is correct, but statement B is incorrect.

Question ID : **63068075073**
Chosen Option : **3**

Q.134 The maximum shear stress in a hollow shaft subjected to a torsional moment _____.

Ans
✓ 1. is at the at the outer surface of the shaft
✗ 2. is at the at the inner surface of the shaft
✗ 3. is at the middle of thickness
✗ 4. can be anywhere on the shaft

Question ID : **63068074992**
Chosen Option : **1**

Q.135 The variation of bending moment between two sections of a beam is equal to:

Ans
- ✔ 1. the area under the shear force diagram
- ✘ 2. the difference of bending moment between the two sections
- ✘ 3. the area under the bending moment diagram
- ✘ 4. the difference of shear force between the two sections

Question ID : **63068074976**
Chosen Option : **1**

Q.136 In an analysis of plane frame structure, members are assumed to be joined together with:

Ans
- ✔ 1. pin joints
- ✘ 2. welded joints
- ✘ 3. riveted joints
- ✘ 4. rigid joints

Question ID : **63068074982**
Chosen Option : **1**

Q.137 The head required at the centrifugal pump inlet to keep the liquid from cavitating or boiling is known as:

Ans
- ✘ 1. minimum head
- ✘ 2. ultimate head
- ✔ 3. net positive-suction head
- ✘ 4. threshold head

Question ID : **63068075083**
Chosen Option : **3**

Q.138 The height to which a liquid would rise in a piezometer tube attached to the flow is the same as the _____.

Ans
- ✔ 1. height of the hydraulic grade line
- ✘ 2. velocity head only
- ✘ 3. gravity head only
- ✘ 4. height of the energy grade line

Question ID : **63068075058**
Chosen Option : **1**

Q.139 Corresponding to the maximum power transmitted through a pipeline, the efficiency of power transmission is:

Ans
- ✔ 1. 66.7%
- ✘ 2. 50.0%
- ✘ 3. 56.7%
- ✘ 4. 76.7%

Question ID : **63068075066**
Chosen Option : **1**

Q.140 When one object presses against another, the stresses developed at the contact surface is referred to as:

Ans
✗ 1. tensile stress
✗ 2. shear stress
✓ 3. bearing stress
✗ 4. normal stress

Question ID : **63068074948**
Chosen Option : **3**

Q.141 A block rests on a horizontal frictional surface. Of the conditions given in the options, in which case can the equation $F = \mu_s N$ be applied (where F is the frictional force, μ_s is the coefficient of static friction and N is the normal reaction)?

Ans
✗ 1. The applied forces tend to move the block along the surface of contact, but are not large enough to set it in motion.
✗ 2. The forces applied to the block do not tend to move it along the surface of contact.
✓ 3. The applied forces are such that the block is just about to slide.
✗ 4. The block is sliding under the action of the applied forces.

Question ID : **63068074941**
Chosen Option : **3**

Q.142 Longitudinal stresses in the body of a thin cylinder (with uniform thickness) having spherical ends are _____ hoop stresses.

Ans
✗ 1. triple of
✗ 2. the same as
✓ 3. half of
✗ 4. double of

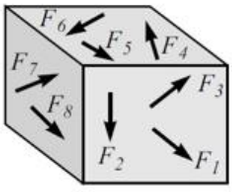
Question ID : **63068074997**
Chosen Option : **3**

Q.143 Hoop strain in the body of a thin cylinder (with uniform thickness 't') having spherical ends is (d = internal diameter, p = internal pressure, E = Young's modulus, v = Poisson's ratio):

Ans
✗ 1. $\frac{pd}{2tE}(4-\nu)$
✗ 2. $\frac{pd}{4tE}(4-\nu)$
✓ 3. $\frac{pd}{4tE}(2-\nu)$
✗ 4. $\frac{pd}{2tE}(2-\nu)$

Question ID : **63068074998**
Chosen Option : **3**

Q.144 The system of forces represented in the following figure is the _____.



Ans
- ✗ 1. non-coplanar unlike parallel force system
- ✗ 2. coplanar non-concurrent and non-parallel force system
- ✓ 3. non-coplanar non-concurrent and non-parallel force system
- ✗ 4. coplanar unlike parallel force system

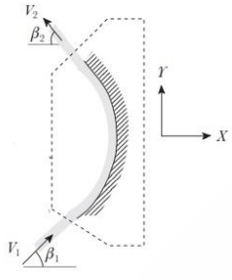
Question ID : **63068074940**
Chosen Option : **3**

Q.145 The head given by a pitot stagnation-velocity tube corresponds to the _____.

Ans
- ✗ 1. velocity head only
- ✓ 2. energy grade line
- ✗ 3. hydraulic grade line
- ✗ 4. gravity head only

Question ID : **63068075061**
Chosen Option : **3**

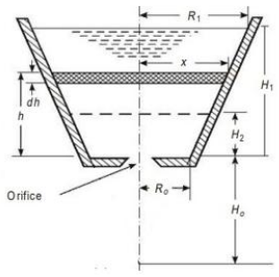
Q.146 Which of the following statements is true about force F due to a high-velocity jet impingement on a stationary curved plate (neglecting friction) as shown in the given figure?



Ans
- ✗ 1. Force in X-direction is dependent on $V_2 \sin\beta_2$
- ✗ 2. Force in Y-direction is dependent on $V_1 \cos\beta_1$
- ✓ 3. Force in X-direction is dependent on $V_1 \cos\beta_1$
- ✗ 4. Force in Y-direction is dependent on $V_2 \cos\beta_2$

Question ID : **63068075068**
Chosen Option : **3**

Q.147 In reference to the conical tank shown in the given figure, which of the following expressions for H_0 is correct?



Ans

✗ 1. $H_0 = \frac{(R_1 - R_0)}{R_1 H_2}$

✓ 2. $H_0 = \frac{R_0 H_1}{(R_1 - R_0)}$

✗ 3. $H_0 = \frac{R_1 H_2}{(R_1 - R_0)}$

✗ 4. $H_0 = \frac{(R_1 - R_0)}{R_0 H_1}$

Question ID : **63068075040**
Chosen Option : **--**

Q.148 The peripheral-velocity factor for an impulse turbine is given by $\phi = \frac{u}{(2gH)^{1/2}}$. The maximum efficiency for an impulse turbine occurs at an approximate value of ϕ equal to _____ (where u = bucket linear velocity, H = head, g = acceleration due to gravity).

Ans

✗ 1. 0.57

✗ 2. 0.27

✓ 3. 0.47

✗ 4. 0.37

Question ID : **63068075077**
Chosen Option : **3**

Q.149 Flow at varying rates through a long straight pipe of uniform cross-section is a _____.

Ans

✗ 1. steady and uniform flow

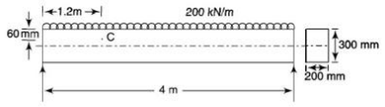
✗ 2. unsteady and non-uniform flow

✓ 3. unsteady and uniform flow

✗ 4. steady and non-uniform flow

Question ID : **63068075025**
Chosen Option : **3**

Q.150 A 200-mm-wide, 300-mm-deep and 4-m-long simply supported beam is shown in the following figure. The bending moment at the point C which is 60 mm below the top surface and 1.2 m from the left support is:



Ans

✔ 1. 336 kN.m

✗ 2. 627 kN.m

✗ 3. 527 kN.m

✗ 4. 236 kN.m

Question ID : **63068074973**
Chosen Option : **1**