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**Notations :**

- Options shown in green color and with ✓ icon are correct.
- Options shown in red color and with ✗ icon are incorrect.

<b>Question Paper Name :</b>	PaperII Civil and Mechanical Engineering Common 22nd August 2023 Shift 1
<b>Subject Name :</b>	Paper II Civil and Mechanical Engineering Common
<b>Actual Answer Key :</b>	Yes
<b>Calculator :</b>	None
<b>Magnifying Glass Required? :</b>	No
<b>Ruler Required? :</b>	No
<b>Eraser Required? :</b>	No
<b>Scratch Pad Required? :</b>	No
<b>Rough Sketch/Notepad Required? :</b>	No
<b>Protractor Required? :</b>	No
<b>Show Watermark on Console? :</b>	Yes
<b>Highlighter :</b>	No
<b>Auto Save on Console?</b>	Yes
<b>Change Font Color :</b>	No
<b>Change Background Color :</b>	No
<b>Change Theme :</b>	No
<b>Help Button :</b>	No
<b>Show Reports :</b>	No
<b>Show Progress Bar :</b>	No
<b>Is this Group for Examiner? :</b>	No
<b>Examiner permission :</b>	Cant View
<b>Show Progress Bar? :</b>	No

**Paper II Civil and Mechanical Engineering Common**

<b>Section type :</b>	Online
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	Yes
<b>Maximum Instruction Time :</b>	0
<b>Is Section Default? :</b>	null

**Question Number : 1 Question Id : 630680319855 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements regarding the assumptions made in the theory of bending is INCORRECT?

**Options :**

- ✗ The value of Young's modulus of elasticity is the same in tension and compression.
- ✗ The transverse sections which were plane before bending remain plane after bending also.
- ✗ The beam is initially straight, and all longitudinal filaments bend into circular arcs with a common centre of curvature.
- ✓ The radius of curvature is small compared with the dimensions of the cross-section.

**Question Number : 2 Question Id : 630680319856 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A cantilever of length 2 metres fails when a load of 2 kN is applied at the free end. If the section of the beam is 40 mm (breadth) × 60 mm (depth), find the section modulus of the rectangular cross-section.

**Options :**

- ✓ 24,000 mm<sup>3</sup>

2. ✘ 36,000 mm<sup>3</sup>
3. ✘ 40,000 mm<sup>3</sup>
4. ✘ 72,000 mm<sup>3</sup>

**Question Number : 3 Question Id : 630680319857 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A steel plate of width 120 mm and thickness 20 mm is bent in the direction of its thickness into a circular arc of radius 10 m. Determine the maximum bending stress induced. Take E (Young's modulus) =  $2 \times 10^5$  N/mm<sup>2</sup>.

**Options :**

1. ✘ 150 N/mm<sup>2</sup>
2. ✔ 200 N/mm<sup>2</sup>
3. ✘ 225 N/mm<sup>2</sup>
4. ✘ 320 N/mm<sup>2</sup>

**Question Number : 4 Question Id : 630680319858 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A 3 m long simply supported beam is loaded with triangular load throughout the length with zero intensity at the left end support to 2 kN/m intensity at the right end support. The maximum bending moment will be at \_\_\_\_\_ from the left support.

**Options :**

1. ✘ 1.50 m
2. ✔ 1.73 m
3. ✘ 1.97 m
4. ✘ 2.22 m

**Question Number : 5 Question Id : 630680319859 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A cantilever of length 2 m fails by bending stress when a load of 2 kN is applied at a free end. If the section of the beam is 40 mm × 60 mm, find the stress at failure.

**Options :**

1. ✔ 166.67 N/mm<sup>2</sup>
2. ✘ 208.98 N/mm<sup>2</sup>
3. ✘ 300.56 N/mm<sup>2</sup>
4. ✘ 375.23 N/mm<sup>2</sup>

**Question Number : 6 Question Id : 630680319860 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements regarding the assumptions made in the Euler's column theory on long columns is INCORRECT?

**Options :**

1. ✘ Initially the column is perfectly straight, and the load is applied axially.
2. ✘ The column will fail by buckling alone.
3. ✘ The length of the column is very large as compared with its lateral dimensions.
4. ✔ The direct stress is very large as compared with the bending stress.

**Question Number : 7 Question Id : 630680319861 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

What is the crippling load (P) for a column by Euler's formula for end condition 'when both ends are fixed'?

$l$  = actual length of the column

E = Young's modulus of the material of the column

$I$  = Least moment of inertia of the column

**Options :**

1. ✔  $P = \frac{4\pi^2 EI}{l^2}$

2. ✘  $P = \frac{2\pi^2 EI}{l^2}$

3. ✘  $P = \frac{\pi^2 EI}{4l^2}$

4. ✘  $P = \frac{\pi^2 EI}{l^2}$

**Question Number : 8 Question Id : 630680319862 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Tensile stresses at a point across two mutually perpendicular planes are  $120 \text{ N/mm}^2$  and  $60 \text{ N/mm}^2$ . Determine the normal stresses on a plane inclined at  $30^\circ$  to the axis of minor stress.

**Options :**

1. ✘  $98 \text{ N/mm}^2$

2. ✔  $105 \text{ N/mm}^2$

3. ✘  $109 \text{ N/mm}^2$

4. ✘  $180 \text{ N/mm}^2$

**Question Number : 9 Question Id : 630680319863 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A**

**Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The point of intersection of Mohr's circle on the Y-axis (vertical axis) represents:

Options :

1. ✘ principal normal stress
2. ✘ normal stress
3. ✔ principal shear stress
4. ✘ shear stress

Question Number : 10 Question Id : 630680319864 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

When a member is subjected to simple shear stress ( $\tau$ ), then the tangential stress ( $\tau_t$ ) on an oblique plane inclined at an angle  $\theta$  is \_\_\_\_\_.

Options :

1. ✘  $\tau_t = -\tau \cos \theta$
2. ✘  $\tau_t = \tau \sin \theta$
3. ✔  $\tau_t = -\tau \cos 2\theta$
4. ✘  $\tau_t = \tau \sin 2\theta$

Question Number : 11 Question Id : 630680319865 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

When a member is subjected to a direct stress ( $\sigma$ ) in one plane, then the maximum shear stress on an oblique plane which is inclined at an angle  $\theta$  with the normal cross-section is \_\_\_\_\_.

Options :

1. ✘  $\sigma$
2. ✘  $\frac{\sigma}{2} \sin 2\theta$
3. ✘  $\sigma \cos^2 \theta$
4. ✔  $\frac{\sigma}{2}$

Question Number : 12 Question Id : 630680319866 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following statements is/are true or false related to Mohr's circle?

Statement 1: Mohr's circle is a graphical method of finding normal, tangential and resultant stresses on an oblique plane.

Statement 2: Mohr's circle will be drawn for the case when a body is subjected to two mutually perpendicular principal stresses which are unequal and unlike (i.e. one is tensile and other is compressive).

Options :

1. ✘ Both statements are false.

2. ✓ Both statements are true.
3. ✘ Statement 1 is true, and statement 2 is false.
4. ✘ Statement 2 is true, and statement 1 is false.

**Question Number : 13 Question Id : 630680319867 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

According to which theory of failure will the failure of a material occur when the maximum principal tensile stress in the complex system reaches the value of the maximum stress at the elastic limit in simple tension or the minimum principal stress reaches the value of the maximum stress at the elastic limit in simple compression?

**Options :**

1. ✓ Maximum principal stress theory
2. ✘ Maximum principal strain theory
3. ✘ Maximum shear stress theory
4. ✘ Maximum shear strain energy theory

**Question Number : 14 Question Id : 630680319868 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The principal stresses at a point in an elastic material are  $200 \text{ N/mm}^2$  (tensile),  $100 \text{ N/mm}^2$  (tensile) and  $50 \text{ N/mm}^2$  (compressive). If the stress at the elastic limit in simple tension is  $200 \text{ N/mm}^2$ , according to the maximum shear stress theory, choose the correct statement from the following.

**Options :**

1. ✘ Maximum shear stress developed in the material is  $100 \text{ N/mm}^2$ .
2. ✘ Maximum shear stress at the elastic limit in simple tension is  $125 \text{ N/mm}^2$ .
3. ✓ Failure will occur.
4. ✘ Failure will not occur.

**Question Number : 15 Question Id : 630680319869 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements is/are true or false related to the theories of failures, which should be generally used in design?

S1: The maximum principal stress theory should be used in case of brittle materials such as cast iron.

S2: The maximum shear stress theory is more suitable for ductile materials.

S3: The maximum principal strain theory is not used, in general, because it only gives reliable results in particular cases.

**Options :**

1. ✘ S1 and S2 are true, and S3 is false.
2. ✘ S1 and S3 are true, and S2 is false.



3. ✘ Only S2 is true.
4. ✔ S1, S2 and S3 are true.

Question Number : 16 Question Id : 630680319870 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Maximum strain energy theory used for members subjected to bi-axial stress is also known as \_\_\_\_\_.

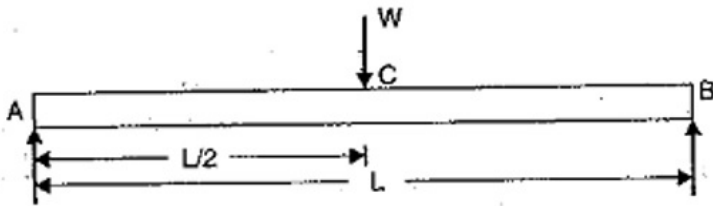
Options :

1. ✘ Saint Venant theory
2. ✘ Rankine's theory
3. ✘ Energy of Distortion theory
4. ✔ Haigh's theory

Question Number : 17 Question Id : 630680319871 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A simply supported beam of length 'L' carries a point load 'W' at its mid span is shown in the figure. Calculate the shear force between C and B.



Options :

1. ✔  $\frac{W}{2}$
2. ✘  $\frac{W}{4}$
3. ✘  $\frac{WL}{4}$
4. ✘  $\frac{WL}{8}$

Question Number : 18 Question Id : 630680319872 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Calculate the maximum deflection of a simply supported beam carrying a point load of 96 kN at midspan.

Take span = 6 m and flexural rigidity of beam (EI) = 20,000 kN/m<sup>2</sup>.

Options :

1. ✔ 21.60 mm
2. ✘ 14.22 mm

3. ✘ 19.12 mm

4. ✘ 23.60 mm

**Question Number : 19 Question Id : 630680319873 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of following methods utilises the strain energy at the position of the load acting on the beam to find deflections?

**Options :**

1. ✘ Double integration method

2. ✘ Superposition method

3. ✘ Moment-Area method

4. ✔ Castigliano's theorem

**Question Number : 20 Question Id : 630680319874 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The maximum deflection ( $y_c$ ) in a cantilever beam carrying point load 'W' at its free end is given by \_\_\_\_\_.

Where  $l$  = length of the beam,  $W$  = point load,  $EI$  = flexural rigidity of the beam.

**Options :**

1. ✘  $y_c = \frac{Wl^2}{2EI}$

2. ✘  $y_c = \frac{Wl^3}{2EI}$

3. ✘  $y_c = \frac{Wl^2}{3EI}$

4. ✔  $y_c = \frac{Wl^3}{3EI}$

**Question Number : 21 Question Id : 630680319875 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The deflection( $y_c$ ) at the mid span of a fixed beam carrying a point load at the mid span is given by \_\_\_\_\_.

Where  $w$  = point load,  $l$  = length of beam,  $E$  = Young's modulus of material used in the beam and  $I$  = moment of inertia of beam cross-section.

**Options :**

1. ✔  $y_c = \frac{wl^3}{192EI}$

2. ✘  $y_c = \frac{wl^4}{384EI}$

3. ✘  $y_c = \frac{wl^3}{3EI}$

4. ✘  $y_c = \frac{wl^3}{64EI}$

**Question Number : 22 Question Id : 630680319876 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A cantilever beam of length 3 m is carrying a point load of 25 KN at the free end. If the moment of inertia of the beam =  $10^8 \text{ mm}^4$  and value of  $E = 2.1 \times 10^5 \text{ N/mm}^2$ , find the deflection at the free end.

**Options :**

1. ✓ 10.71 mm
2. ✗ 9.54 mm
3. ✗ 8.76 mm
4. ✗ 7.87 mm

**Question Number : 23 Question Id : 630680319877 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The maximum deflection in a cantilever beam loaded with point load at the free end occurs at:

**Options :**

1. ✗ fixed end
2. ✓ free end
3. ✗ half span
4. ✗ one-fourth span from the fixed end

**Question Number : 24 Question Id : 630680319878 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A cantilever beam of length 'L' is loaded with uniformly distributed load 'w' per unit length. If EI is flexural rigidity, then what is the deflection at its free end?

**Options :**

1. ✗  $wL^3/3EI$
2. ✗  $wL^3/6EI$
3. ✓  $wL^4/8EI$
4. ✗  $wL^4/16EI$

**Question Number : 25 Question Id : 630680319879 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Identify the correct option related to moment-area method by considering the below statements?

Statement 1: The moment-area method is a semi-graphical procedure that utilises the properties of the area under the bending moment diagram.

Statement 2: The moment-area method is useful for determining the slope or deflection of a beam at a specified location.



Options :

1. ✘ Both statements are false.
2. ✔ Both statements are true.
3. ✘ Statement 1 is true, and statement 2 is false.
4. ✘ Statement 2 is true, and statement 1 is false.

Question Number : 26 Question Id : 630680319880 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following statements regarding the properties of conjugate beam is INCORRECT?

Options :

1. ✘ A simple support for the real beam remains simple support for the conjugate beam.
2. ✘ The point of maximum moment for the conjugate beam corresponds to a point of maximum deflection for the real beam.
3. ✘ The point of zero shear for the conjugate beam corresponds to a point of zero slope for the real beam.
4. ✔ The length of a conjugate beam is not equal to the length of the actual beam.

Question Number : 27 Question Id : 630680319881 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following statements is/are true related to the assumptions undertaken in order to derive a differential equation of elastic curve for the loaded beam?

**Statement 1:** Stress is proportional to strain, i.e. Hooke's law applies. Thus, the equation is valid only for beams that are not stressed beyond the elastic limit.

**Statement 2:** The curvature of a beam is always large.

**Statement 3:** Any deflection resulting from the shear deformation of the material or shear stresses is neglected.

Options :

1. ✘ Only 3
2. ✘ 1 and 2
3. ✔ 1 and 3
4. ✘ Only 2

Question Number : 28 Question Id : 630680319882 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Tensile strain along the length of a member is defined as the ratio of \_\_\_\_\_.

Options :

1. ✔ increase in length to original length
2. ✘ decrease in length to original length

3. ✘ original length to increase in length
4. ✘ original length to decrease in length

**Question Number : 29 Question Id : 630680319883 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Find the minimum diameter of a steel wire which is used to lift a load of 4000 N in the vertical direction if the stress in the rod is not to exceed  $102 \text{ MN/m}^2$ .

**Options :**

1. ✘ 6.73 mm
2. ✔ 7.06 mm
3. ✘ 7.91 mm
4. ✘ 8.43 mm

**Question Number : 30 Question Id : 630680319884 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The correct expression for thermal strain ( $e$ ) when both ends of the bar are fixed to rigid supports is \_\_\_\_\_.

Where  $\alpha$  = co-efficient of linear expansion

T = rise or fall of temperature

E = Young's modulus of elasticity of material used in a bar.

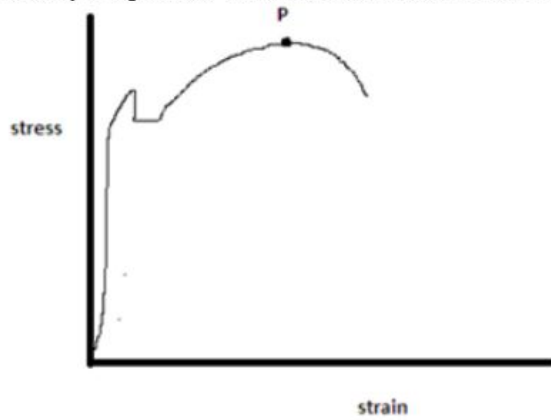
**Options :**

1. ✔  $e = \alpha T$
2. ✘  $e = \alpha TE$
3. ✘  $e = \frac{\alpha}{T}$
4. ✘  $e = \frac{\alpha}{TE}$

**Question Number : 31 Question Id : 630680319885 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Identify the point 'P' on the stress-strain curve for mild steel.



Options :

1. ✓ Ultimate stress point
2. ✗ Upper yield point
3. ✗ Lower yield point
4. ✗ Elastic limit

Question Number : 32 Question Id : 630680319886 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following expressions provides total extension (dL) of a uniformly tapering circular rod of diameters  $D_1$  and  $D_2$  when the rod is subjected to an axial load 'P'?

L = total length of the rod

E = Young's modulus

Options :

1. ✗  $dL = \frac{2PL}{\pi E D_1 D_2}$
2. ✓  $dL = \frac{4PL}{\pi E D_1 D_2}$
3. ✗  $dL = \frac{PL}{2\pi E D_1 D_2}$
4. ✗  $dL = \frac{PL}{4\pi E D_1 D_2}$

Question Number : 33 Question Id : 630680319887 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

The strain produced in the body upon applying deforming force, where the change in length takes place, is known as:

Options :

1. ✗ lateral strain
2. ✗ shear strain
3. ✗ volumetric strain

4. ✓ longitudinal strain

Question Number : 34 Question Id : 630680319888 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

The ratio of decrease in length to the original length of the body when it is subjected to a certain magnitude of axial force is known as \_\_\_\_\_.

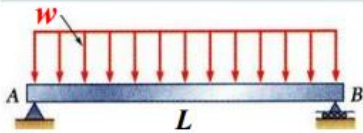
Options :

- 1. ✗ Volumetric strain
- 2. ✓ Compressive strain
- 3. ✗ Tensile strain
- 4. ✗ Shear strain

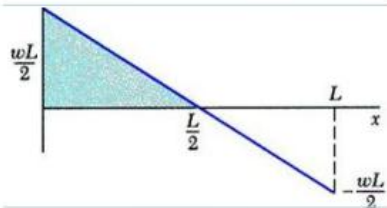
Question Number : 35 Question Id : 630680319889 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

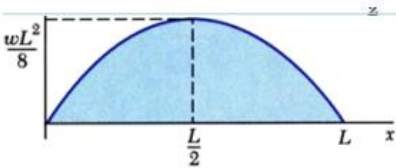
Which of the following represents the correct bending moment diagram for the beam shown in the figure?



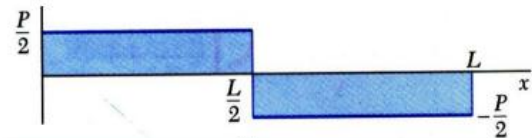
Options :



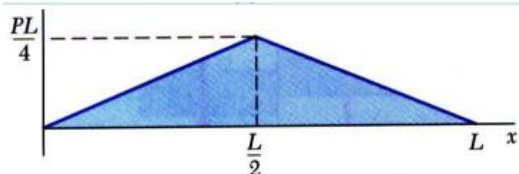
1. ✗



2. ✓



3. ✗



4. ✗

Question Number : 36 Question Id : 630680319890 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following is a statically determinate structure?

Options :

1. ✓ Double-side overhanging beams
2. ✗ Fixed beams
3. ✗ Fixed arches
4. ✗ Two-hinged arches

Question Number : 37 Question Id : 630680319891 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following is wrongly matched?

Options :

1. ✓ The resistance offered per unit area of body against deformation ----> strain
2. ✗ The stress induced in a body which is subjected to two forces equal in magnitude and opposite direction -----> compressive stress
3. ✗ The stress induced in a body which is subjected to two forces equal in magnitude and opposite direction -----> tensile stress
4. ✗ The property by virtue of which certain materials return back to their original position after the removal of the external force -----> elasticity

Question Number : 38 Question Id : 630680319892 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Determine the change in length of a steel bar which is 4 m long, 30 mm wide and 20 mm thick and is subjected to an axial pull of 30 kN in the direction of its length. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ .

Options :

1. ✓ 1 mm
2. ✗ 2.4 mm
3. ✗ 3 mm
4. ✗ 3.6 mm

Question Number : 39 Question Id : 630680319893 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Find the young's modulus of a brass rod of diameter 25 mm and of length 250 mm which is subjected to a tensile load of 50 kN when the extension of the rod is equal to 0.3 mm.

Options :

1. ✓  $84.88 \text{ GN/m}^2$
2. ✗  $79.24 \text{ GN/m}^2$
3. ✗  $76.54 \text{ GN/m}^2$
4. ✗  $67.78 \text{ GN/m}^2$

Question Number : 40 Question Id : 630680319894 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33



What do you understand by a stress necessary to cause a non-proportional or permanent extension equal to a defined percentage (0.1% to 0.2%) of gauge length?

Options :

1. ✘ Rupture strength
2. ✘ Ultimate strength
3. ✘ Factor of safety
4. ✔ Proof stress

Question Number : 41 Question Id : 630680319895 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A beam of 5 m effective span has the left end 'P' as a free end, whereas the right end 'Q' is the fixed supported end. The beam is subjected to a uniformly distributed load of 3kN/m on the whole span. Find the point having the maximum shear force.

Options :

1. ✔ Point 'Q'
2. ✘ Midpoint of the beam span
3. ✘ 1 m from the fixed support
4. ✘ Point 'P'

Question Number : 42 Question Id : 630680319896 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A beam AB of length 'L' is simply supported at the ends A and B and is carrying a uniformly varying load with zero intensity at end A to 'w' kN per unit length at B. The vertical component of support reaction at 'A' is:

Options :

1. ✘  $wL$  kN
2. ✘  $\frac{wL}{2}$  kN
3. ✔  $\frac{wL}{6}$  kN
4. ✘  $\frac{wL}{8}$  kN

Question Number : 43 Question Id : 630680319897 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A cantilever of length 'L' fixed at 'A' and carrying a gradually varying load with zero intensity at the free end 'B' to 'w' kN per unit length at the fixed end. Calculate the shear force by taking a section X-X at a distance 'x' from the free end 'B'.

Options :

1. ✔  $\frac{wx^2}{2L}$  kN

2. ✘  $\frac{wx}{2L}$  kN

3. ✘  $\frac{wx^2}{L}$  kN

4. ✘  $\frac{wx}{L}$  kN

**Question Number : 44 Question Id : 630680319898 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A solid shaft of 150 mm diameter is used to transmit torque. Find the maximum torque transmitted by the shaft if the maximum shear stress induced to the shaft is 48 N/mm<sup>2</sup>.

**Options :**

1. ✘ 29,820.58 N-m

2. ✔ 31,812.75 N-m

3. ✘ 42,236.21 N-m

4. ✘ 47,631.45 N-m

**Question Number : 45 Question Id : 630680319899 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The ultimate stress for a hollow steel column which carries an axial load of 1.8 MN is 440 N/mm<sup>2</sup>. If the external diameter of the column is 200 mm, determine the permissible stress. Take factor of safety as 4.

**Options :**

1. ✘ 98 N/mm<sup>2</sup>

2. ✔ 110 N/mm<sup>2</sup>

3. ✘ 120 N/mm<sup>2</sup>

4. ✘ 132 N/mm<sup>2</sup>

**Question Number : 46 Question Id : 630680319900 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

What is the expression for modulus of resilience?

Where  $\sigma$  = stress induced in the body, E = young's modulus, V = volume of the body

**Options :**

1. ✘ Modulus of resilience =  $\frac{\sigma^2}{2E} \cdot V$

2. ✘ Modulus of resilience =  $\frac{\sigma^2}{E} \cdot V$

3. ✔ Modulus of resilience =  $\frac{\sigma^2}{2E}$

4. ✘ Modulus of resilience =  $\frac{\sigma^2}{E}$

**Question Number : 47 Question Id : 630680319901 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

If the load P is applied gradually, then the expression for maximum stress induced in a body is:

(where A = area of the cross-section)

**Options :**

1. ✘  $\sigma = 0.5 \frac{P}{A}$

2. ✔  $\sigma = \frac{P}{A}$

3. ✘  $\sigma = 2 \frac{P}{A}$

4. ✘  $\sigma = 2.5 \frac{P}{A}$

**Question Number : 48 Question Id : 630680319902 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

When a bar is subjected to a sudden load, the expression for maximum strain energy (U) stored in a body when the load is applied suddenly is:

(P = load applied suddenly)

$\sigma$  = stress induced by the suddenly applied load

A = area of the cross-section

L = length of the bar)

**Options :**

1. ✘  $U = \frac{\sigma^2}{E} AL$

2. ✘  $U = \frac{\sigma^2}{E} A$

3. ✔  $U = \frac{\sigma^2}{2E} AL$

4. ✘  $U = \frac{\sigma^2}{2E} A$

**Question Number : 49 Question Id : 630680319903 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A tensile load of 60 kN is gradually applied to a circular bar of 4 cm diameter and 5m length. If the value of  $E = 2 \times 10^5$  N/mm<sup>2</sup>, determine the stretch in the rod.

**Options :**

1. ✔ 1.19 mm

2. ✘ 1.90 mm

3. ✘ 2.34 mm

4. ✘ 3.26 mm

**Question Number : 50 Question Id : 630680319904 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A steel rod is 2 m long and 50 mm in diameter. An axial pull of 100 kN is suddenly applied to the rod. Calculate the instantaneous stress induced in the rod. Take  $E = 200 \text{ GN/m}^2$ .

**Options :**

1. ✘  $98.43 \text{ N/mm}^2$

2. ✔  $101.86 \text{ N/mm}^2$

3. ✘  $110.67 \text{ N/mm}^2$

4. ✘  $125.43 \text{ N/mm}^2$

**Question Number : 51 Question Id : 630680319905 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements regarding the modulus of elasticity is INCORRECT?

**Options :**

1. ✘ The modulus of elasticity is a measure of the stiffness of the material.

2. ✘ Since the modulus of elasticity is needed for computing deflections of beams and other members, it is an important design value.

3. ✘ The modulus of elasticity is determined by the binding forces between atoms.

4. ✔ Materials with lower modulus of elasticity show smaller elastic strain value, resulting from the applied force that compared to materials with higher modulus of elasticity.

**Question Number : 52 Question Id : 630680319906 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The devices which are used for measuring the pressure of fluid by balancing the fluid column by the spring or dead weight are \_\_\_\_\_.

**Options :**

1. ✔ Mechanical gauges

2. ✘ Differential manometers

3. ✘ Piezometer

4. ✘ Simple manometers

**Question Number : 53 Question Id : 630680319907 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Water is flowing through a pipe of 5 cm diameter under a pressure of  $29.43 \text{ N/cm}^2$  (gauge) and with mean velocity of 2 m/s. Find the total head or total energy per unit weight of the water at a cross-section which is 5 m above the datum line.

**Options :**

1. ✘ 28.76 m

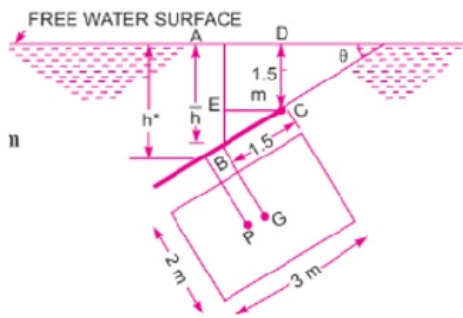
2. ✘ 31.21 m
3. ✔ 35.20 m
4. ✘ 42.65 m

Question Number : 54 Question Id : 630680319908 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A rectangular plane surface 2 m wide and 3 m deep lies in water in such a way that its plane makes an angle of  $30^\circ$  with the free surface of water. Determine the position of the centre of pressure when the upper edge is 1.5 m below the free water surface.

$$(\sin^2 30^\circ = \frac{1}{4}, \cos^2 30^\circ = \frac{3}{4})$$



Options :

1. ✔ 2.33 m
2. ✘ 3.45 m
3. ✘ 3.98 m
4. ✘ 4.23 m

Question Number : 55 Question Id : 630680319909 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following principles states that when pressure is applied to a closed system of fluid, the pressure is transmitted to every part of the fluid and also to the walls of the container in which the fluid is enclosed?

Options :

1. ✘ Bernoulli's principle
2. ✘ Archimedes' principle
3. ✘ Newton's second law of motion
4. ✔ Pascal's principle

Question Number : 56 Question Id : 630680319910 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33



The pressure intensity at a point in a fluid is given as  $3.924 \text{ N/cm}^2$ . Find the corresponding height of fluid when the fluid is water.

Take density of water =  $1000 \text{ kg/m}^3$ , acceleration due to gravity  $g = 9.81 \text{ m/s}^2$

Options :

1. ✘ 3.67 m
2. ✔ 4.00 m
3. ✘ 4.44 m
4. ✘ 5.12 m

Question Number : 57 Question Id : 630680319911 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

The pressure which is measured with the help of a pressure measuring instrument in which the atmospheric pressure is taken as datum is known as \_\_\_\_\_.

Options :

1. ✘ Absolute pressure
2. ✘ Vacuum pressure
3. ✔ Gauge pressure
4. ✘ Atmospheric pressure

Question Number : 58 Question Id : 630680319912 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Calculate the gauge pressure at a point 3 m below the free surface of a liquid having a density of  $1.53 \times 10^3 \text{ kg/m}^3$ ; density of water is  $1000 \text{ kg/m}^3$ .

Options :

1. ✘  $29,765 \text{ N/m}^2$
2. ✘  $30,023 \text{ N/m}^2$
3. ✘  $34,328 \text{ N/m}^2$
4. ✔  $45,028 \text{ N/m}^2$

Question Number : 59 Question Id : 630680319913 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A circular opening of 3 m diameter in a vertical side of a tank is closed by a disc of 3 m diameter which can rotate about a horizontal diameter. Calculate the force on the disc.

Options :

1. ✘ 198.76 kN
2. ✔ 277.36 kN

3. ✘ 297.43 kN

4. ✘ 302.56 kN

**Question Number : 60 Question Id : 630680319914 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A rectangular plate 3 m long and 1 m wide is immersed vertically in water in such a way that its 3 metres side is parallel to the water surface and is 1 metre below it. Find the total pressure on the plate.

**Options :**

1. ✘ 62.11 kN

2. ✘ 55.32 kN

3. ✘ 50.34 kN

4. ✔ 44.14 kN

**Question Number : 61 Question Id : 630680319915 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The depth of the centre of pressure ( $h^*$ ) for a vertically immersed surface from the free surface of the liquid is \_\_\_\_\_.

Where

$h$  = Depth of the centre of pressure below free liquid surface

$I_G$  = Moment of inertia of the immersed surface

$x$  = Depth of the centre of gravity of the surface from the liquid surface

$\theta$  = Angle at which the immersed surface is inclined with the liquid surface and

$A$  = Area of the surface

**Options :**

1. ✔  $h^* = \frac{I_G}{Ah} + h$ 2. ✘  $h^* = \frac{I_G}{Ah} - h$ 3. ✘  $h^* = \frac{I_G \sin^2 \theta}{Ah} + h$ 4. ✘  $h^* = \frac{I_G \sin^2 \theta}{Ah} - h$ 

**Question Number : 62 Question Id : 630680319916 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A uniform body of size 3 m long  $\times$  2 m wide  $\times$  1 m deep floats in water. What is the weight of the body if the depth of immersion is 0.8 m?

**Options :**

1. ✘ 36,552 N

2. ✘ 39,012 N
3. ✔ 47,088 N
4. ✘ 52,347 N

**Question Number : 63 Question Id : 630680319917 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The point about which a body starts oscillating when the body is tilted is known as:

**Options :**

1. ✘ Buoyancy
2. ✘ Centre of Buoyancy
3. ✔ Meta-centre
4. ✘ Meta-centric Height

**Question Number : 64 Question Id : 630680319918 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Identify the correct expression to find the time period (T) of oscillation or rolling of a floating body?

Where K = radius of gyration, GM = Meta-centric height and g = acceleration due to gravity

**Options :**

1. ✔  $T = 2\pi \sqrt{\frac{K^2}{GM \times g}}$
2. ✘  $T = 2\pi \sqrt{\frac{K}{GM \times g}}$
3. ✘  $T = \pi \sqrt{\frac{K^2}{GM \times g}}$
4. ✘  $T = \pi \sqrt{\frac{K}{GM \times g}}$

**Question Number : 65 Question Id : 630680319919 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements regarding assumptions made in the derivation of Bernoulli's equation is INCORRECT?

**Options :**

1. ✔ The flow is rotational.
2. ✘ The flow is incompressible.
3. ✘ The fluid is ideal.
4. ✘ The flow is steady.

**Question Number : 66 Question Id : 630680319920 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The expression to determine the moment of inertia for triangle about the base ( $I_b$ ) is:

(where  $b$  = width of the triangle and  $h$  = height of the triangle)

**Options :**

1. ✘  $\frac{bh^3}{10}$

2. ✔  $\frac{bh^3}{12}$

3. ✘  $\frac{bh^3}{36}$

4. ✘  $\frac{bh^3}{64}$

**Question Number : 67 Question Id : 630680319921 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements is/are true or false related to orifice meter?

S1: Orifice meter is a device used for measuring the rate of flow of fluid through a pipe.

S2: The orifice diameter is kept generally 0.5 times the diameter of the pipe though it may vary from 0.4 to 0.8 times the pipe diameter.

**Options :**

1. ✘ S1 is true, and S2 is false.

2. ✘ S1 is false, and S2 is true.

3. ✔ Both S1 and S2 are true.

4. ✘ Both S1 and S2 are false.

**Question Number : 68 Question Id : 630680319922 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following devices is used for measuring the velocity of fluid flow at any point in a pipe or channel?

**Options :**

1. ✘ Piezometer

2. ✘ Venturimeter

3. ✘ Orifice meter

4. ✔ Pitot tube

**Question Number : 69 Question Id : 630680319923 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A 30 cm × 15 cm venturimeter is inserted in a vertical pipe carrying water, flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 20 cm. Find the difference of pressure head.

**Options :**

1. ✘ 221 cm of water
2. ✔ 252 cm of water
3. ✘ 300 cm of water
4. ✘ 312 cm of water

**Question Number : 70 Question Id : 630680319924 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Identify the correct relationship between piezometric head, elevation head and pressure head.

**Options :**

1. ✘ Piezometric head = Elevation head × pressure head
2. ✘ Piezometric head = Elevation head – Pressure head
3. ✔ Piezometric head = Elevation head + Pressure head
4. ✘ Piezometric head = Elevation head / Pressure head

**Question Number : 71 Question Id : 630680319925 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Hydraulic gradient line is defined as:

**Options :**

1. ✔ The line which gives the sum of pressure head and datum head of a flowing fluid in a pipe with respect to some reference line
2. ✘ The line which gives the difference of pressure head and datum head of a flowing fluid in a pipe with respect to some reference line
3. ✘ The line which gives the difference of pressure head, datum head and kinetic head of a flowing fluid in a pipe with respect to some reference line
4. ✘ The line which gives the sum of pressure head, datum head and kinetic head of a flowing fluid in a pipe with respect to some reference line

**Question Number : 72 Question Id : 630680319926 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements is/are true or false related to negative pressure at the throat of a venturi meter?

S1: At the throat of a venturi meter, the velocity is minimum because it has minimum cross-sectional area and consequently the pressure is minimum. Thus, the pressure may be zero or even negative.

S2: When the negative pressure reaches the value of vapour pressure of the liquid flowing in the pipe, the liquid evaporates. So, the flow becomes discontinuous due to the existed vapour.

**Options :**

1. ✘ S1 is true, and S2 is false.
2. ✔ S1 is false, and S2 is true.
3. ✘ Both S1 and S2 are true.
4. ✘ Both S1 and S2 are false.



**Question Number : 73 Question Id : 630680319927 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements regarding the assumptions of Euler's equation of motion is INCORRECT?

**Options :**

1. ✘ The fluid is ideal (non-viscous or no friction losses).
2. ✘ The velocity of flow is uniform over the section.
3. ✘ The fluid is incompressible.
4. ✔ The flow is unsteady.

**Question Number : 74 Question Id : 630680319928 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A pitot-static tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 8 m and static pressure head is 7 m. Calculate the velocity of flow assuming the co-efficient of tube is equal to 0.98.

**Options :**

1. ✘ 3.87 m/s
2. ✔ 4.34 m/s
3. ✘ 5.21 m/s
4. ✘ 5.83 m/s

**Question Number : 75 Question Id : 630680319929 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Identify the correct option by considering the below mentioned statements with respect to the moment of momentum equation?

S1: Moment of momentum equation is applied for the analysis of flow problems in turbines and centrifugal pumps.

S2: Moment of momentum equation is applied for finding torque exerted by water on sprinkler.

**Options :**

1. ✘ S1 is true and S2 is false.
2. ✘ S1 is false and S2 is true.
3. ✔ Both S1 and S2 are true.
4. ✘ Both S1 and S2 are false.

**Question Number : 76 Question Id : 630680319930 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Consider the following statements regarding the assumptions made in the theory of simple bending.

S1: The value of Young's modulus of elasticity of material used in beam is same in tension and compression.

S2: The beam is initially straight and all longitudinal filaments bend into circular arcs with a common centre of curvature

S3: The radius of curvature is small compared with the dimensions of the beam cross-section

Choose the appropriate option from the following:

**Options :**

1. ✓ S1 and S2 are true and S3 is false
2. ✗ S2 and S3 are true and S1 is false
3. ✗ Only S2 is false
4. ✗ All S1, S2, S3 are true

**Question Number : 77 Question Id : 630680319931 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A steel plate of width 120mm and of thickness 20mm is bent into a circular arc of radius 10m. Determine the maximum stress induced. Take  $E=2 \times 10^5 \text{ N/mm}^2$ , Moment of inertia,  $I = 8 \times 10^4 \text{ mm}^4$

**Options :**

1. ✗  $100 \text{ N/mm}^2$
2. ✗  $150 \text{ N/mm}^2$
3. ✓  $200 \text{ N/mm}^2$
4. ✗  $240 \text{ N/mm}^2$

**Question Number : 78 Question Id : 630680319932 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following statements regarding the assumptions made in the Euler's column theory is INCORRECT?

**Options :**

1. ✓ The direct stress is very large as compared to the bending stress
2. ✗ The cross-section of the column is uniform throughout its length
3. ✗ The column will fail by buckling alone
4. ✗ The column is initially perfectly straight and the load is applied axially

**Question Number : 79 Question Id : 630680319933 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

What is the relation between effective length ( $L_e$ ) and actual length ( $L_a$ ), if the end condition of column is "one end is fixed and other is free"?

**Options :**

1. ✘  $L_e = \frac{L_a}{2}$

2. ✘  $L_e = \frac{L_a}{\sqrt{2}}$

3. ✔  $L_e = 2L_a$

4. ✘  $L_e = L_a$

**Question Number : 80 Question Id : 630680319934 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The correct equation to determine the deflection ( $y$ ) by moment area method is,

Where,  $A$  = Area of B.M diagram,  $x$  = Distance of C.G of area

**Options :**

1. ✔  $y = \frac{Ax}{EI}$

2. ✘  $y = \frac{EI}{Ax}$

3. ✘  $y = \frac{2Ax}{EI}$

4. ✘  $y = \frac{Ax}{2EI}$

**Question Number : 81 Question Id : 630680319935 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A Beam 3m long, simply supported at its ends, is carrying a point load 'W' at its mid span. If the slope at the ends of the beam should not exceed  $1^\circ$  (0.01745 radians), find the deflection at the mid span of the beam.

**Options :**

1. ✘ 15.64 mm

2. ✔ 17.45 mm

3. ✘ 18.68 mm

4. ✘ 20.23 mm

**Question Number : 82 Question Id : 630680319936 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A steel rod 150cm long and of diameter 2 cm is subjected to an axial pull of 20kN. If the modulus of elasticity of the material of the rod is  $2 \times 10^5 \text{ N/mm}^2$ , determine the axial stress.

**Options :**

1. ✘ 93.21  $\text{N/mm}^2$  (tensile)

2. ✘ 85.92  $\text{N/mm}^2$  (tensile)

3. ✘ 72.55  $\text{N/mm}^2$  (tensile)

4. ✓ 63.66 N/mm<sup>2</sup>(tensile)

**Question Number : 83 Question Id : 630680319937 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Which of the following device is used for measuring the velocity of fluid flow at any point in a pipe or channel?

**Options :**

1. ✗ Piezometer
2. ✗ Venturimeter
3. ✗ Orifice meter
4. ✓ Pitot tube

**Question Number : 84 Question Id : 630680319938 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A sudden change in the slope of the hydraulic line drawn for a straight section of a water pipeline indicates the:

**Options :**

1. ✗ change in ground slope
2. ✗ presence of water hammer
3. ✗ accumulation of sediments
4. ✓ leakage in pipeline

**Question Number : 85 Question Id : 630680319939 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Water is flowing through a pipe under a pressure of 2,00,000 N/m<sup>2</sup> and with the mean velocity of 2 m/s. Find the total head of the water at the cross section which is 4 m above the datum line.

Take  $g = 10 \text{ m/s}^2$ .

**Options :**

1. ✗ 22.2 m
2. ✓ 24.2 m
3. ✗ 26.2 m
4. ✗ 20 m

**Question Number : 86 Question Id : 630680319940 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A Horizontal pipe of constant diameter is carrying a fluid at velocity V. If only frictional losses are considered then

**Options :**

1. ✗ Pressure head will increase

2. ✘ Pressure head + Datum head will be constant
3. ✔ Datum head + Dynamic head will be constant
4. ✘ Pressure head will be constant

Question Number : 87 Question Id : 630680319941 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

In an 8 cm diameter pipe, the minor losses are equal to  $5V^2/2g$ . The equivalent length of pipe to account for the minor losses for  $f = 0.04$  is:

Options :

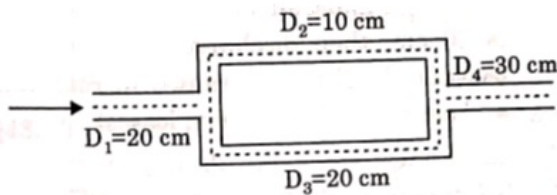
1. ✔ 10 m
2. ✘ 5 m
3. ✘ 20 m
4. ✘ 15 m

Question Number : 88 Question Id : 630680319942 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

For a given system of pipe, answer the following

If both pipes are made up of same material and  $Q_2 = 2\text{m}^3/\text{s}$ , then the value of  $Q_3$  will be (neglect all losses other than frictional loss). Consider Pipe 2 and pipe 3 are parallel.



Options :

1. ✘  $8\text{ m}^3/\text{s}$
2. ✘  $4\text{ m}^3/\text{s}$
3. ✘  $14.4\text{ m}^3/\text{s}$
4. ✔  $11.31\text{ m}^3/\text{s}$

Question Number : 89 Question Id : 630680319943 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Find the head lost due to friction in a pipe of 300 mm diameter and length 50 m, through which water is flowing at a velocity of 3 m/s using Chezy's formulae.

[Take  $C = 60$ ]

Options :

1. ✘ 1.5 m



2. ✘ 1.825 m

3. ✔ 1.665 m

4. ✘ 2.025 m

**Question Number : 90 Question Id : 630680319944 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Find the loss of head when a pipe of diameter of 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow through pipe is  $0.25 \text{ m}^3/\text{sec}$ .

**Options :**

1. ✘ 1.925 m

2. ✔ 1.816 m

3. ✘ 0.985 m

4. ✘ 2.231 m

**Question Number : 91 Question Id : 630680319945 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The diameter of circular pipe is suddenly increased by two times. The ratio of loss of energy to the velocity head before expansion is:

**Options :**

1. ✘  $\frac{1}{2}$ 2. ✘  $\frac{1}{4}$ 3. ✔  $\frac{9}{16}$ 4. ✘  $\frac{16}{9}$ 

**Question Number : 92 Question Id : 630680319946 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Water is flowing through a horizontal pipe of a diameter of 200 mm, at a velocity of 3 m/s. A circular solid plate of diameter 150 mm is placed in the pipe to obstruct the flow. Find the loss of head due to obstruction in pipe is  $C_c = 0.62$

**Options :**

1. ✔ 3.311 m

2. ✘ 3.561 m

3. ✘ 3 m

4. ✘ 2.961 m

**Question Number : 93 Question Id : 630680319947 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The water is flowing with the velocity of 1.5 m/s in a pipe length of 2.5km and of diameter 500 mm. At the end of the pipe, a valve is provided. Find the rise in pressure is valve is closed in 25 seconds. Take the value of  $C=1460\text{m/s}$

**Options :**

1. ✘  $10 \text{ N/cm}^2$
2. ✘  $18 \text{ N/cm}^2$
3. ✔  $15 \text{ N/cm}^2$
4. ✘  $20 \text{ N/cm}^2$

**Question Number : 94 Question Id : 630680319948 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct statement(s) for Hydraulic gradient line (HGL) from among the following.

**Statement A:**

It will always lie below the total energy line in a pipe flow.

**Statement B:**

It is the line joining the points representing the values of Piezometric head at the various cross-sections of pipe in pipe flow.

**Options :**

1. ✘ Only statement A
2. ✘ Only statement B
3. ✔ Both statements A and B are correct
4. ✘ Both statements A and B are incorrect

**Question Number : 95 Question Id : 630680319949 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct statement(s) for the total energy line (TEL) from among the following.

**Statement A:**

It is the line joining the points representing the value of the velocity head + elevation head at the various cross-section of pipe in a pipe flow.

**Statement B:**

This line always goes down in the direction of flow until and unless energy supplied externally.

**Options :**

1. ✘ Only statement A
2. ✔ Only statement B
3. ✘ Both statements A and B are correct

4. ✘ Both statements A and B are incorrect

Question Number : 96 Question Id : 630680319950 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

What is the condition to obtain the maximum efficiency of transmission through a pipe, where  $H$  = head available at the inlet and  $H_L$  = frictional head loss?

Options :

1. ✘  $H_L = H/2$
2. ✔  $H_L = H/3$
3. ✘  $H_L = H/4$
4. ✘  $H_L = H/5$

Question Number : 97 Question Id : 630680319951 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

The relation that must hold for the flow to be irrotational is:

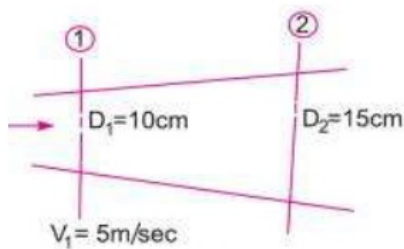
Options :

1. ✘  $\frac{\partial u}{\partial x} = \frac{\partial u}{\partial y}$
2. ✔  $\frac{\partial u}{\partial y} - \frac{\partial v}{\partial x} = 0$
3. ✘  $\frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} = 0$
4. ✘  $\frac{\partial v}{\partial x} = \frac{\partial v}{\partial y}$

Question Number : 98 Question Id : 630680319952 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

The diameter of a pipe at sections 1 and 2 are 10 cm and 15 cm, respectively. If the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine the velocity at section 2.



Options :

1. ✔ 2.22 m/s
2. ✘ 2.10 m/s
3. ✘ 2.45 m/s

4. ✘ 2.62 m/s

**Question Number : 99 Question Id : 630680319953 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A compressible fluid flows steadily through a duct whose area reduces by 40% from section (1) to section (2). It is further known that the corresponding reduction in density fluid is 15% compared to section (1). The velocity at section (2) is increased by a factor of:

**Options :**

1. ✘ 2.05

2. ✘ 2.18

3. ✔ 1.96

4. ✘ 1.85

**Question Number : 100 Question Id : 630680319954 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

If a liquid enters a pipe of diameter  $d$  with a velocity  $v$ , what will be its velocity at the exit if the diameter reduces to  $0.25d$ ?

**Options :**

1. ✘  $2v$

2. ✔  $16v$

3. ✘  $8v$

4. ✘  $32v$

**Question Number : 101 Question Id : 630680319955 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Two pipes, each of diameter  $d$  having same fluid velocity  $v$ , converge to form a pipe of diameter  $D$ . What should be the relation between  $d$  and  $D$  such that the flow velocity in the third pipe becomes one-third of that in each of the two pipes?

**Options :**

1. ✔  $D^2 = 6d^2$

2. ✘  $D^2 = 8d^2$

3. ✘  $D^2 = 12d^2$

4. ✘  $D^2 = 5d^2$

**Question Number : 102 Question Id : 630680319956 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The velocity potential function( $\phi$ ) is given by an expression

$$\Phi = -xy^3 - x^2 + \frac{x^3y}{3} + y^2.$$

Find the velocity component in x and y directions.

Options :

1. ✓  $U = \frac{y^3}{3} + 2x - x^2y$        $V = xy^2 - \frac{x^3}{3} - 2y$

2. ✗  $U = \frac{x^3}{3} + 2y - x^2y$        $V = xy^2 - \frac{x^3}{3} + 2y$

3. ✗  $U = \frac{y^3}{3} + 2x - xy^2$        $V = xy^2 - \frac{x^3}{3} - 2y$

4. ✗  $U = \frac{y^3}{3} + 2x - x^2y$        $V = xy^2 - \frac{x^3}{3} - 2x$

Question Number : 103 Question Id : 630680319957 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A stream function is given by  $\psi = 5x - 6y$ . Calculate the velocity components in x and y directions.

Options :

1. ✓ 6 units/sec, 5 units/sec

2. ✗ 5 units/sec, 6 units/sec

3. ✗ 5 units/sec, 7 units/sec

4. ✗ 7 units/sec, 5 units/sec

Question Number : 104 Question Id : 630680319958 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following is the use of flow net analysis in fluid mechanics?

Options :

1. ✗ To determine the surface tension of flowing fluid

2. ✗ To determine viscosity for given boundary of flow

3. ✓ To design hydraulic structure

4. ✗ To determine porosity of structure

Question Number : 105 Question Id : 630680319959 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33



Select the correct option regarding flow net from among the following.

**Statement 1:**

Flow net is changed if boundary conditions are changed.

**Statement 2:**

It helps to determine the quantity of seepage.

**Options :**

1. ✘ Statement 1 is true and statement 2 is false.
2. ✘ Statement 1 is false and statement 2 is true.
3. ✔ Both statements 1 and 2 are true.
4. ✘ Both statements 1 and 2 are false.

**Question Number : 106 Question Id : 630680319960 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A fluid flow is given by  $V = 8x^3i - 10x^2yj$ . Find the shear strain rate.

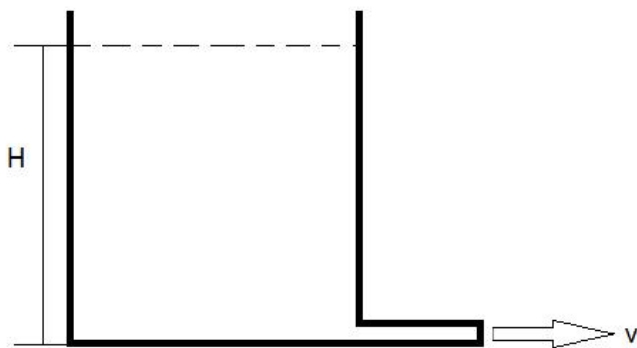
**Options :**

1. ✘  $-5xy$
2. ✔  $-10xy$
3. ✘  $-15xy$
4. ✘  $-12xy$

**Question Number : 107 Question Id : 630680319961 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A beaker contains water up to a certain height as shown. If the water is allowed to get discharged through a small pipe (of a uniform diameter), what type of flow will it be in the pipe?



**Options :**

1. ✘ Steady and uniform
2. ✔ Unsteady and uniform
3. ✘ Steady and non-uniform

## 4. ✖ Unsteady and non-uniform

Question Number : 108 Question Id : 630680319962 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Consider the following parameters related to fluid flow.

1. Vorticity
2. Velocity potential
3. Stream function

Which of the given parameters exist both in rotational and irrotational flows?

Options :

1. ✖ 1 and 2
2. ✖ 2 and 3
3. ✔ 1 and 3
4. ✖ 1, 2 and 3

Question Number : 109 Question Id : 630680319963 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

An oil of viscosity 0.25 stokes flows through a pipe diameter of 10 cm. The flow is critical at a velocity of:

Options :

1. ✔ 0.5 m/s
2. ✖ 0.72 m/s
3. ✖ 0.68 m/s
4. ✖ 5 m/s

Question Number : 110 Question Id : 630680319964 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A plane flow has velocity components  $u = \frac{x}{T_1}$ ,  $v = \frac{3y}{T_2}$  and  $w = 0$  along x, y, z directions, respectively, where  $T_1$  and

$T_2$  are NOT equal to zero, and are constants having the dimension of time. The given flow exists if:

Options :

1. ✖  $T_2 = T_1$
2. ✖  $T_2 = -T_1$
3. ✖  $T_2 = -2T_1$
4. ✔  $T_2 = -3T_1$

Question Number : 111 Question Id : 630680319965 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Which of the following stream functions  $\psi$  is a possible irrotational flow field?

Options :

1. ✓  $\Psi = y^2 - x^2$

2. ✗  $\Psi = A \sin(xy)$

3. ✗  $\Psi = Ax^2y^2$

4. ✗  $\Psi = Ax + By^2$

Question Number : 112 Question Id : 630680319966 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

For the following flows, determine the components of rotation about the z axes.

$$U = y^2 \quad V = -3x$$

Options :

1. ✓  $\frac{(-3 - 2y)}{2}$

2. ✗  $\frac{(-2 - 3y)}{2}$

3. ✗  $\frac{(-3 - 2x)}{2}$

4. ✗  $\frac{(-2 + 3y)}{2}$

Question Number : 113 Question Id : 630680319967 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A  
Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Select the correct option with respect to the following statements for rotation in fluid.

**Statement A:**

A flow is rotational if fluid elements undergo rotation about their axis while flowing along streamlines.

**Statement B:**

The flow is rotational when its vorticity vector is non-zero in some of its regions.

Options :

1. ✗ Only statement A is correct.

2. ✗ Only statement B is correct.

3. ✓ Both the statements A and B are correct.

4. ✗ Both the statements A and B are incorrect.

**Question Number : 114 Question Id : 630680319968 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The velocity along the centreline of a nozzle of length  $L$  is given by  $V = 2t \left[ 1 - \frac{x}{2L} \right]^2$ . Where  $V$  = velocity in m/s,  $t$  = time in seconds and  $x$  = distance from inlet to nozzle. Find the local acceleration when  $t = 3$  s,  $x = 0.5$  m, and  $L = 0.8$  m.

**Options :**

1. ✓ 0.945 m/s<sup>2</sup>
2. ✗ 0.855 m/s<sup>2</sup>
3. ✗ 0.90 m/s<sup>2</sup>
4. ✗ 0.785 m/s<sup>2</sup>

**Question Number : 115 Question Id : 630680319969 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Two velocity components are given, find the third component such that they satisfy the continuity equation

$$u = x^3 + y^2 + 2z^2, v = -x^2y - yz - xy, w = ?$$

**Options :**

1. ✗  $xy + z^2 - 2x^2y$
2. ✓  $xz + \frac{z^2}{2} - 2x^2z$
3. ✗  $xy + \frac{z^2}{2} - 2x^2z$
4. ✗  $xz + z^2 - 2x^2y$

**Question Number : 116 Question Id : 630680319970 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

In a streamline steady flow, A and B on streamline are 1 m apart and the flow velocity varies uniformly from 2 m/s to 5 m/s. What is the acceleration of fluid at B?

**Options :**

1. ✗ 3 m/s<sup>s</sup>
2. ✗ 6 m/s<sup>s</sup>
3. ✗ 9 m/s<sup>s</sup>
4. ✓ 15 m/s<sup>s</sup>

**Question Number : 117 Question Id : 630680319971 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Vorticity is given as :

**Options :**

1. ✘ equal to rotation
2. ✔ 2 times the rotation
3. ✘ 1.5 times the rotation
4. ✘ 3 times the rotation

**Question Number : 118 Question Id : 630680319972 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

An open circular tank of 20 cm diameter and 100 cm long contains water up to a height of 60 cm. The tank is rotated about its vertical axis at 300 rpm. Find the depth of parabola formed from the free surface of water?

**Options :**

1. ✔ 50.28 cm
2. ✘ 48.8 cm
3. ✘ 54.22 cm
4. ✘ 59.6 cm

**Question Number : 119 Question Id : 630680319973 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

The correct sequence in the direction of the flow of water for installation in a hydropower plant is:

**Options :**

1. ✘ reservoir, surge tank, turbine, penstock
2. ✔ reservoir, penstock, surge tank, turbine
3. ✘ reservoir, turbine, penstock, surge tank
4. ✘ reservoir, turbine, surge tank, penstock

**Question Number : 120 Question Id : 630680319974 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

For maximum transmission of power through a pipeline with total head  $H$ , the head lost due to friction ( $h_f$ ) is given as:

**Options :**

1. ✘ 0.25H
2. ✘ 0.67H
3. ✘ 0.5H
4. ✔ 0.33H

**Question Number : 121 Question Id : 630680319975 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**



Match the turbines in List I their specific speeds in List – II.

List-I	List-II
A. Francis	1. 10-35
B. Kaplan	2. 35-60
C. Pelton (one jet)	3. 60-300
D. Pelton (two jets)	4. 300-1000

Options :

1. ✘ A-1, B-2, C-3, D-4
2. ✘ A-2, B-3, C-4, D-1
3. ✔ A-3, B-4, C-1, D-2
4. ✘ A-4, B-1, C-3, D-2

Question Number : 122 Question Id : 630680319976 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A pipe of diameter 200 mm is carrying water with a velocity of 2.5 m/s for transmission of power. If the head available at outlet is 400 m, find the power at the outlet of the pipe.

[Take  $\rho = 1000 \text{ kg/m}^3$ ,  $g = 10 \text{ m/s}^2$ ]

Options :

1. ✘ 296 kW
2. ✘ 302 kW
3. ✔ 314 kW
4. ✘ 323 kW

Question Number : 123 Question Id : 630680319977 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

In a hydraulic machine, the moment of momentum of water is reduced by 12 kNm, when the machine is rotating at 600 rpm. The power developed is:

Options :

1. ✔ 754 kW
2. ✘ 762 kW
3. ✘ 725kW
4. ✘ 789 kW

**Question Number : 124 Question Id : 630680319978 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct option with respect to the following statements.

**Statement 1:** In impulse turbines, pressure change occurs only in the nozzles of the machine. The pressure of liquid does not change while flowing through the rotor of the machine.

**Statement 2:** The pressure of liquid changes while it flows through the rotor of the machine in reaction turbines.

**Options :**

1. ✘ Statement 1 is true and statement 2 is false.
2. ✘ Statement 1 is false and statement 2 is true.
3. ✔ Both statements 1 and 2 are true.
4. ✘ Both statements 1 and 2 are false.

**Question Number : 125 Question Id : 630680319979 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Match the following.

List I	List II
A.Nozzle size	1. Affects the penetration capability of a water jet.
B.Pressure	2. Determines the primary factor that affects the impact force of a water jet.
C.Velocity	3. Caused by pressure fluctuations in water jet applications
D.Cavitation erosion	4. Influences the impact force of a water jet when decreased

**Options :**

1. ✘ A-4, B-1, C-2, D-3
2. ✘ A-4, B-1, C-3, D-2
3. ✘ A-1, B-4, C-2, D-3
4. ✔ A-1, B-2, C-3, D-4

**Question Number : 126 Question Id : 630680319980 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A jet of water 75 mm in diameter having velocity of 20 m/s strikes a series of the flat plates arranged around the periphery of a wheel such that each plate appears successively before the jet. If the plates are moving at a velocity of 5 m/s, compute the work done per second on the plate.

**Options :**

1. ✘ 6430 Nm/s

2. ✘ 6980 Nm/s
3. ✔ 6630 Nm/s
4. ✘ 6280 Nm/s

**Question Number : 127 Question Id : 630680319981 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A jet of oil of relative density of 0.8 and of area  $0.03 \text{ m}^2$  issues at 8.5 m/s. If it strikes normally on a stationary plate, the force exerted on the plate is:

**Options :**

1. ✔ 1734 N
2. ✘ 1619 N
3. ✘ 1829 N
4. ✘ 1698 N

**Question Number : 128 Question Id : 630680319982 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Water is flowing through a pipe at the end of which a nozzle is fitted. The diameter of the nozzle is 100 mm, and the head of water at the centre of the nozzle is 100 m. Find the force exerted by the jet of water on a fixed vertical plate.

The coefficient of velocity is given as 0.95.

**Options :**

1. ✘ 14.5 kN
2. ✘ 21 kN
3. ✘ 18.3 kN
4. ✔ 13.9 kN

**Question Number : 129 Question Id : 630680319983 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A centrifugal pump delivers water at the rate 50 litres/sec against a total head of 40 m. The power required to drive the pump is:

**Options :**

1. ✘ 12 kW
2. ✘ 15.2 kW
3. ✔ 19.6 kW
4. ✘ 22.8 kW

**Question Number : 130 Question Id : 630680319984 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A centrifugal pump transfers energy from \_\_\_\_\_.

Options :

1.  rotor to fluid
2.  fluid to rotor
3.  draft to rotor
4.  rotor to draft

Question Number : 131 Question Id : 630680319985 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

Water is to be pumped out of a deep well under a total head of 90 m. A number of identical pumps of design speed 1000 rpm and specific speed 900 rpm with a rated capacity of 144 l/s are available. The number of pumps required will be:

Options :

1.  2
2.  3
3.  4
4.  5

Question Number : 132 Question Id : 630680319986 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A centrifugal pump with radial vanes tips at the outlet has an impeller of 100 mm outer diameter. If the rotative speed is 3000 rpm and manometric efficiency is 0.8, then what is the net head developed?

Options :

1.  10 m
2.  20 m
3.  40 m
4.  15 m

Question Number : 133 Question Id : 630680319987 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A centrifugal pump with 1.2 m diameter runs at 200 rpm and pumps 1880 l/s, the average lift being 6 m. The angle that the vanes make at exit with the tangent to the impeller is  $26^\circ$ , and the radial velocity of flow is 2.5 m/s. Determine the manometric efficiency.

Options :

1.  69%
2.  82%
3.  63%
4.  55%

Question Number : 134 Question Id : 630680319988 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A

**Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A circular pump delivers 1000 l/min at 2000 rpm against total head of 50 m, and requires 32 BHP for operation. If the speed is reduced to 1000 rpm, the discharge and head developed will be:

**Options :**

1. ✘ 500 l/min and 25 min
2. ✔ 500 l/min and 12.5 min
3. ✘ 250 l/min and 25 min
4. ✘ 250 l/min and 12.5 min

**Question Number : 135 Question Id : 630680319989 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A centrifugal pump delivers a manometric head of 12 m when pumping a liquid of relative density 0.8. If all other factors remain the same but the liquid has a relative density of 1, then the new manometric head would be:

**Options :**

1. ✘ 10.6 m
2. ✘ 10.2 m
3. ✔ 9.6 m
4. ✘ 9.2 m

**Question Number : 136 Question Id : 630680319990 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Find the number of pumps required to pump from water from deep well under a total head of 89m. All the pumps are identical and are running at 800 rpm. The specific speed of each pump is 25 while the rated capacity of each pump is

0.16 m<sup>3</sup>/s.

**Options :**

1. ✘ 2
2. ✔ 3
3. ✘ 4
4. ✘ 5

**Question Number : 137 Question Id : 630680319991 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**



Select the correct option with respect to the following statements.

**Statement 1:**

Pumps operating in parallel boost the discharge, whereas pumps operating in series boost the head.

**Statement 2:**

Pumps operating in parallel boost the head, whereas pumps operating in series boost the discharge.

**Statement 3:**

Both, pumps operating in parallel and pumps operating in series, boost the discharge.

Which of the following statements is/are correct?

**Options :**

1. ✓ Only 2
2. ✗ Only 2 and 3
3. ✗ 1, 2 and 3
4. ✗ Only 1

**Question Number : 138 Question Id : 630680319992 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct option with respect to the following statements.

**Statement A:**

Centrifugal pumps do not come under rotodynamic pumps.

**Statement B:**

Roto-dynamic pumps must have to be centrifugal rather than centripetal, from the very basic principles of hydrodynamics. Also, the stages are in series.

**Options :**

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

**Question Number : 139 Question Id : 630680319993 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Match the machines in List-1 with the respective associated terms in List-2.

List-1	List- 2
A. Centrifugal pump	a. Percent slip
B. Reciprocating pump	b. Bucket
C. Francis turbine	c. Guide blade
D. Pelton wheel	d. Volute chamber

Options :

1. ✘ A-d, B-c, C-a, D-b
2. ✔ A-d, B-a, C-c, D-b
3. ✘ A-b, B-c, C-a, D-d
4. ✘ A-b, B-a, C-c, D-d

Question Number : 140 Question Id : 630680319994 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

A plate of very large length is inside a fluid. Assume that the fluid is flowing over a plate at velocity 0.3 m/s. The length at which the boundary layer will become turbulent is:

[Take  $\mu = 0.002 \text{ kg/ms}$  and  $\rho = 1200 \text{ kg/m}^3$ ]

Options :

1. ✘ 4.74 m
2. ✘ 3.33 m
3. ✔ 2.78 m
4. ✘ 4.13 m

Question Number : 141 Question Id : 630680319995 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1 Wrong Marks : 0.33

The momentum thickness for boundary layer with velocity distribution inside Boundary layer as

$$\frac{u}{v_0} = \left(\frac{y}{\delta}\right)$$

Options :

1. ✘  $\frac{\delta}{2}$
2. ✘  $\frac{\delta}{4}$

3. ✓  $\frac{\delta}{6}$

4. ✗  $\frac{\delta}{8}$

**Question Number : 142 Question Id : 630680319996 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Read the given assertion and reason and select the correct option.

**Statement A:**

The boundary layer thickness increases with increasing Reynolds number.

**Statement B:**

Higher Reynolds number corresponds to higher fluid velocity and greater fluid momentum, resulting in a thicker boundary layer.

**Options :**

1. ✗ Only Statement A True
2. ✗ Only Statement B True
3. ✓ Both the statement A and B are True
4. ✗ Both the statement A and B are False

**Question Number : 143 Question Id : 630680319997 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

A flat plate  $1\text{ m} \times 1\text{ m}$ , moves at  $5\text{ m/s}$  normal to its plane. Compute the resistance of the plate when surrounding fluid is water with mass density  $1000\text{ kg/m}^3$ .

Assume  $C_d = 1.15$

**Options :**

1. ✓ 14,375 N
2. ✗ 13,420 N
3. ✗ 14,180 N
4. ✗ 14,490 N

**Question Number : 144 Question Id : 630680319998 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct statement(s) for drag force on flat plate from among the following.

**Statement A:**

The Von Karman equation for boundary layer flow is used to find the frictional drag on smooth flat plate for both laminar and turbulent boundary layers.

**Statement B:**

Von Karman suggested a method to find the frictional drag based on the momentum equation.

**Options :**

1. ✘ Only statement A is correct.
2. ✘ Only statement B is correct.
3. ✔ Both the statements A and B are correct.
4. ✘ Both the statements A and B are incorrect.

**Question Number : 145 Question Id : 630680319999 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Oil with free stream velocity of 2 m/s flows over a thin plate 2 m wide and 2 m long. Calculate the boundary layer thickness.

(Take specific gravity as 0.86 and kinematic viscosity as  $10^{-5}$  m<sup>2</sup>/s.)

**Options :**

1. ✔ 15.5 mm
2. ✘ 16.6 mm
3. ✘ 13.8 mm
4. ✘ 14.2 mm

**Question Number : 146 Question Id : 630680320000 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Determine the thickness of the boundary layer at the trailing edge of a smooth plate of length 4 m and width of 1.5 m, when the plate is moving at a velocity of 4 m/s in stationary air.

(Take kinematic viscosity of air as  $1.5 \times 10^{-5}$  m<sup>2</sup>/s)

**Options :**

1. ✘ 90 mm
2. ✔ 92.1 mm
3. ✘ 89.6 mm
4. ✘ 88.2 mm

**Question Number : 147 Question Id : 630680320001 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct statement(s) for turbulent flow from among the following.

**Statement A:**

Irregularity or randomness in time and space

**Statement B:**

Dissipation of the kinetic energy of the turbulence by viscous shear stresses.

**Options :**

1. ✘ Only statement A is correct.
2. ✘ Only Statement B is correct.
3. ✔ Both statements A and B are correct.
4. ✘ Both statements A and B are incorrect.

**Question Number : 148 Question Id : 630680320002 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct statement(s) for real fluid from among the following.

**Statement A:**

Viscosity introduces resistance to motion by causing shear or friction forces between fluid particles and between these and boundary walls.

**Statement B:**

For flow to take place, work must be done against these resistance forces. In this process, energy is converted into heat (mechanical energy loss).

**Options :**

1. ✘ Only statement A is correct.
2. ✘ Only Statement B is correct.
3. ✔ Both statements A and B are correct.
4. ✘ Both statements A and B are incorrect.

**Question Number : 149 Question Id : 630680320003 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

With the boundary layer separation, displacement thickness \_\_\_\_\_.

**Options :**

1. ✔ increases
2. ✘ decreases
3. ✘ remains the same
4. ✘ is independent



**Question Number : 150 Question Id : 630680320004 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Wrong Marks : 0.33**

Select the correct option with respect to the following statements.

**Statement A:**

Boundary layer thickness is the horizontal distance from the solid surface at which the velocity of the fluid becomes equal to 0.19 times the free stream velocity of the fluid approaching toward the solid surface.

**Statement B:**

The turbulent zone also has a smaller laminar region near the solid surface known as the laminar sublayer, and the thickness of this layer is denoted by  $\delta'$ .

**Options :**

1. ✘ Only statement A is correct.
2. ✔ Only statement B is correct.
3. ✘ Both statements A and B are correct.
4. ✘ Both statements A and B are incorrect.