Strength of Materials

Strain

1. The dimension of strain is?

a) LT^{-2}

b) N/m^2

c) N

d) Dimensionless

View Answer

Answer: d
Explanation: Strain is the ratio of change in dimension to original dimension. So it is dimensionless.

2. What is tensile strain?

a) The ratio of change in length to the original length

b) The ratio of original length to the change in length

c) The ratio of tensile force to the change in length

d) The ratio of change in length to the tensile force applied

View Answer

Answer: a
Explanation: The tensile stress is the ratio of tensile force to the change i length. It is the stress induced in a body when subjected to two equal and opposite pulls. The ratio of change in length to the original length is the tensile strain.

3. Find the strain of a brass rod of length 250mm which is subjected to a tensile load of 50kN when the extension of rod is equal to 0.3mm?

a) 0.025

b) 0.0012

c) 0.0046

d) 0.0014

View Answer

Answer: b
Explanation: Strain = dL/L = 0.3/250 = 0.0012.

4. Find the elongation of an steel rod of 100mm length when it is subjected to a tensile strain of 0.005?

a) 0.2mm

b) 0.3mm

c) 0.5mm

d) 0.1mm

View Answer

Answer: c
Explanation: dL = strain x L = 0.005 x 100 = 0.5mm.

5. A tensile test was conducted on a mild steel bar. The diameter and the gauge length of bat was 3cm and 20cm respectively. The extension was 0.21mm. What is the value to strain?

a) 0.0010

b) 0.00105

c) 0.0105

d) 0.005

View Answer

Answer: b
Explanation: Strain = dL/L = 0.21/200 = 0.0005.

6. i) Strain is a fundamental behaviour of a material.

ii) Strain does not have a unit.

a) Both i and ii are true and ii is the correct explanation of i

b) Both i and ii ate true but ii is not the correct explanation of i

c) i is true but ii is false

d) ii is true but i is false

View Answer

Answer: b
Explanation: Strain is measured in a laboratory that is why it is called a fundamental quantity. Also since it is the ratio of the dimension of length to the dimension of length, it is dimensionless.

7. A tensile test was conducted on a steel bar. The gauge length of the bar was 10cm and the extension was 2mm. What will be the percentage elongation?

a) 0.002

b) 0.02

c) 0.2

d) 2

View Answer

Answer: d
Explanation: The percentage elongation = dL/L x 100 = 2/100 x 100 = 2.

8. The lateral strain is ____________

a) The ratio of axial deformation to the original length

b) The ratio of deformation in area to the original area

c) The strain at right angles to the direction of applied load

d) The ratio of length of body to the tensile force applied on it

View Answer

Answer: c
Explanation: The lateral strain is the strain at right angles to the direction of the applied load. The lateral strain is accompanied by the longitudinal strain.

9. The unit of force in S.I. units is ?

a) Kilogram

b) Newton

c) Watt

d) Dyne

View Answer

Answer: b
Explanation: Force = mass x acceleration = kg x m/s^2 = N.

10. Which of the following is not the unit of distance?

a) Angstrom

b) Light year

c) Micron

d) Milestone

View Answer

Answer: d
Explanation: Milestone means achievement. it is not and unit of distance.

11. A solid cube is subjected to equal normal forces on all its faces. The volumetric strain will be x-times the linear strain in any of the three axes when?

a) X=1

b) X=2

c) X=3

d) X=4

View Answer

Answer: c
Explanation: The volumetric strain is the change in dimension in three directions and the linear strain depends on the change in only one direction so the volumetric strain is 1 times the linear strain in any of the three directions.

12. A rod 200cm long is subjected to an axial pull due to which it elongates about 2mm. Calculate the amount of strain?

a) 0.001

b) 0.01

c) 0.02

d) 0.002

View Answer

Answer: a
Explanation: The strain is given by = dL / L = 2/2000 = 0.001.
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13. Some structural members subjected to a long time sustained loads deform progressively with time especially at elevated temperatures. What is such a phenomenon called?

a) Fatigue

b) Creep

c) Creep relaxation

d) Fracture

View Answer

Answer: b
Explanation: Creep is the deformation progressively with time. It comes when the body is subjected to long time load. After the instant deflection due to load, the deformation occurs slowly with time.

14. Find the strain of a brass rod of length 100mm which is subjected to a tensile load of 50kN when the extension of rod is equal to 0.1mm?

a) 0.01

b) 0.001

c) 0.05

d) 0.005

View Answer

Answer: b
Explanation: Strain = dL/L = 0.1/100 = 0.001.
Elasticity

1. The property by which a body returns to its original shape after removal of the force is called ___________

a) Plasticity

b) Elasticity

c) Ductility

d) Malleability

View Answer

Answer: b
Explanation: When an external force acts on a body, the body tends to undergo some deformation. If the external force is removed and the body comes back to its original shape and size, the body is known as elastic body and this property is called elasticity.

2. The property of a material by which it can be beaten or rolled into thin plates is called ___________

a) Malleability

b) Plasticity

c) Ductility

d) Elasticity

View Answer

Answer: a
Explanation: A material can be beaten into thin plates by its property of malleability.

3. Which law is also called as the elasticity law?

a) Bernoulli's law

b) Stress law

c) Hooke's law

d) Poisson's law

View Answer

Answer: c
Explanation: The hooke"s law is valid under the elastic limit of a body. It itself states that stress is proportional to the strain within the elastic limit.

4. The materials which have the same elastic properties in all directions are called ___________

a) Isotropic

b) Brittle

c) Homogeneous

d) Hard

View Answer

Answer: a
Explanation: Same elastic properties in all direction is called the homogenity of a material.

5. A member which does not regain its original shape after removal of the load producing deformation is said ___________

a) Plastic

b) Elastic

c) Rigid

d) None of the mentioned

View Answer

Answer: a
Explanation: A plastic material does not regain its original shape after removal of load. An elastic material regain its original shape after removal of load.

6. The body will regain it is previous shape and size only when the deformation caused by the external forces, is within a certain limit. What is that limit?

a) Plastic limit

b) Elastic limit

c) Deformation limit

d) None of the mentioned

View Answer

Answer: b
Explanation: The body only regain its previous shape and size only upto its elastic limit.

7. The materials which have the same elastic properties in all directions are called ___________

a) Isotropic

b) Brittle

c) Homogenous

d) Hard

View Answer

Answer: a
Explanation: Isotropic materials have the same elastic properties in all directions.

8. As the elastic limit reaches, tensile strain ___________

a) Increases more rapidly

b) Decreases more rapidly

c) Increases in proportion to the stress

d) Decreases in proportion to the stress

View Answer

Answer: a
Explanation: On reaching the tensile stress to the elastic limit after the proportionality limit, the stress is no longer proportional to the strain. Then the value of strain rapidly increases.

9. What kind of elastic materials are derived from a strain energy density function?

a) Cauchy elastic materials

b) Hypo elastic materials

c) Hyper elastic materials

d) None of the mentioned

View Answer

Answer: c
Explanation: The hyper elastic materials are derived from a strain energy density function. A model is hyper elastic if and only if it is possible to express the cauchy stress tensor as a function of the deformation gradient.

10. What the number that measures an object's resistance to being deformed elastically when stress is applied to it?

a) Elastic modulus

b) Plastic modulus

c) Poisson's ratio

d) Stress modulus

View Answer

Answer: a
Explanation: The elastic modulus is the ratio of stress to strain.
Hooke's Law

1. The law which states that within elastic limits strain produced is proportional to the stress producing it is known as ______________

a) Bernoulli's law

b) Hooke's law

c) Stress law

d) Poisson's law

View Answer

Answer: b
Explanation: Hooke's law states that strain is directly proportional to strain produced by the stress when a material is loaded within the elastic limit.

2. For an isotropic, homogeneous and elastic material obeying Hooke's law, the number of independent elastic constants is ____________

a) 2

b) 3

c) 9

d) 1

View Answer

Answer: b
Explanation: There are 3 constants Young's modulus, Shear modulus and Bulk modulus.

3. What is the factor of safety?

a) The ratio of stress to strain

b) The raio of permissible stress to the ultimate stress

c) The ratio of ultimate stress to the permissible stress

d) The ratio of longitudinal strain to stress

View Answer

Answer: c
Explanation: Factor of safety is the ratio of ultimate stress to the permissible stress.

4. What is Hooke's law for the 1-D system?

a) The relation between normal stress and the corresponding strain

b) The relation between shear stress and the corresponding strain

c) The relation between lateral strain and the corresponding stress

d) None of the mentioned

View Answer

Answer: a
Explanation: For the 1-D system, the stress will be only in one direction. Lateral stress is for an area while normal stress is of a length.

5. Limit of proportionality depends upon _____________

a) Area of cross-section

b) Type of loading

c) Type of material

d) All of the mentioned

View Answer

Answer: a
Explanation: The proportionality limit is proportional to the area of cross-section. The material type and loading type will have no influence on the proportionality limit.

6. The stress at which extension of a material takes place more quickly as compared to the increase in load is called _____________

a) Elastic point

b) Plastic point

c) Breaking point

d) Yielding point

View Answer

Answer: d
Explanation: On the stress strain curve, on the elastic point the stress of a material takes place more quickly.

7. Which of these is a non-hoookean material?

a) Steel

b) Rubber

c) Aluminium

d) Copper

View Answer

Answer: b
Explanation: Rubber is generally regarded as a "non-hookean" material because its elasticity is stress dependent and sensitive to temperature and loading rate.
advertisement

8. Where in the stress-strain curve, the hooke's law is valid?

a) Strain hardening region

b) Necking region

c) Elastic range

d) Valid everywhere

View Answer

Answer: c
Explanation: The hooke's law itself states that it is valid only up to the elastic range of the material I.e. only to that limit where the material is behaving elastic.

9. Highest value of stress for which Hooke's law is applicable for a given material is called ____________

a) Stress limit

b) Strain limit

c) Proportional limit

d) Significant limit

View Answer

Answer: c
Explanation: The hooke's law is valid only when the stress is proportional to the strain, that is only in the proportionality limit.
Stress & Strain Curve

1. The slope of the stress-strain curve in the elastic deformation region is ____________

a) Elastic modulus

b) Plastic modulus

c) Poisson's ratio

d) None of the mentioned

View Answer

Answer: a
Explanation: The elastic modulus is the ratio of stress and strain. So on the stress strain curve, it is the slope.

2. What is the stress-strain curve?

a) It is the percentage of stress and stain

b) It is the relationship between stress and strain

c) It is the difference between stress and strain

d) None of the mentioned

View Answer

Answer: b
Explanation: The relationship between stress and strain on a graph is the stress strain curve. It represents the change in stress with change in strain.

3. Which point on the stress strain curve occurs after the proportionality limit?

a) Upper yield point

b) Lower yield point

c) Elastic limit

d) Ultimate point

View Answer

Answer: c
Explanation: The curve will be stress strain proportional upto the proportionality limit. After these, the elastic limit will occur.

4. Which point on the stress strain curve occurs after the lower yield point?

a) Yield plateau

b) Upper yield point

c) Ultimate point

d) None of the mentioned

View Answer

Answer: a
Explanation: The points on the curve comes in the given order,
A. proportionality limit
B. elastic limit
C. upper yield point
D. lower yield point
E. yield plateau
F. ultimate point
G. breaking point.

5. Which point on the stress strain curve occurs after yield plateau?

a) lower yield point

b) Upper yield point

c) Ultimate point

d) Breaking point

View Answer

Answer: c
Explanation: After the yield plateau the curve will go up to its maximum limit of stress which is its ultimate point.

6. Which point on the stress strain curve occurs after the ultimate point?

a) Last point

b) Breaking point

c) Elastic limit

d) Material limit

View Answer

Answer: b
Explanation: After the ultimate point the value of stress will reduce on increasing of strain and ultimately the material will break.

7. Elastic limit is the point _____________

a) up to which stress is proportional to strain

b) At which elongation takes place without application of additional load

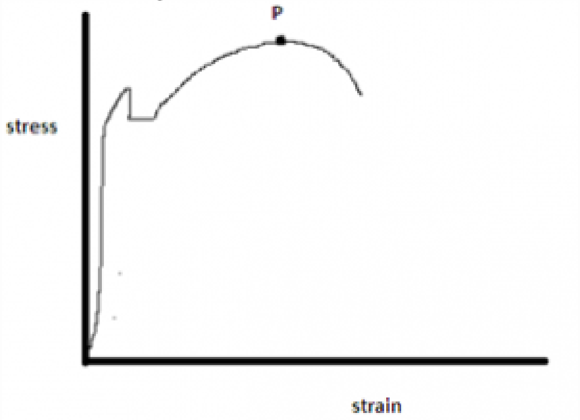
c) Up to which if the load is removed, original volume and shapes are regained

d) None of the mentioned

View Answer

Answer: c
Explanation: The elastic limit is that limit up to which any material behaves like an elastic material.

8. What is the point P shown on the stress strain curve?



a) Upper yield point

b) Yield plateau

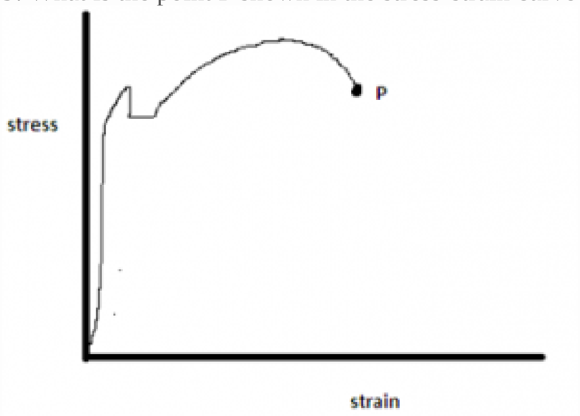
c) Elastic limit

d) Ultimate point

View Answer

Answer: d
Explanation: It is the point showing the maximum stress to which the material can be subjected in a simple tensile stress.

9. What is the point P shown in the stress-strain curve?



a) Lower yield point

b) Elastic limit

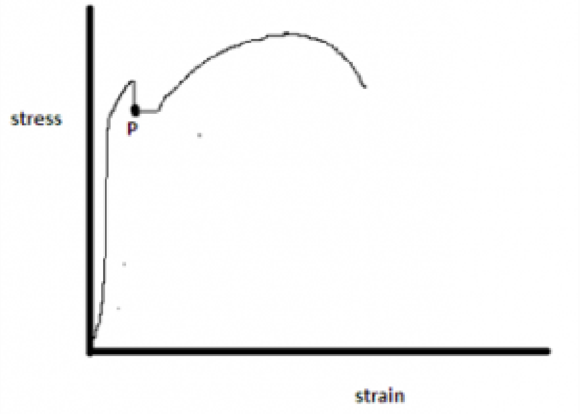
c) Proportionality limit

d) Breaking point

View Answer

Answer: d
Explanation: The breaking point is the point where the material breaks. The breaking point will be the last point on the stress strain curve.

10. What is the point shown in the stress strain curve?



a) Elastic limit

b) Lower yield point

c) Yield plateau

d) Lower strain point

View Answer

Answer: b
Explanation: It is the lower yield point at which the curve levels off and plastic deformation begins.
advertisement

11. Where is the necking region?

a) The area between lower yield point and upper yield point

b) The area between the plastic limit and elastic limit

c) The area between the ultimate point and initial point

d) The area between the ultimate point and rupture

View Answer

Answer: d
Explanation: Necking is a tensile strain deformation which is cased in after the ultimate amount of stress occurs in the material.
Properties of Strain

1. The property of a material by which it can be drawn into thin wires is?

a) Malleability

b) Plasticity

c) Ductility

d) Elasticity

View Answer

Answer: c
Explanation: The ductile material can be drawn into wires because it can resist large deformation. Malleability is the property by which it can be made into thin sheets.

2. If the material has identical elastic properties in all directions, it is called _____________

a) Elastic

b) Isotropic

c) Plastic

d) Homogeneous

View Answer

Answer: b
Explanation: An homogeneous material is that with uniform composition. An elastic and plastic are different on the criteria.

3. Why is the strain the fundamental property but not the stress?

a) Because it is dimensionless

b) Because it is a ratio

c) Because it's value is calculated in the laboratory

d) No stress is the fundamental property

View Answer

Answer: c
Explanation: The stress is the fundamental property because it is calculated in the laboratory. It is a non dependable value.

4. The material in which large deformation is possible before absolute failure by rupture is called _____________

a) Plastic

b) Elastic

c) Brittle

d) Ductile

View Answer

Answer: d
Explanation: The ductile material can be drawn into wires because it can resist large deformation before it fails.

5. What is a creep?

a) Gradual increase of plastic strain with time at constant load

b) Gradual increase of elastic strain with time at constant load

c) Gradual increase of plastic strain with time at varying load

d) Gradual increase of elastic strain with time at varying load

View Answer

Answer: a
Explanation: Creep is the property by virtue of which a metal specimen undergoes additional deformation with the passage of time under sustained loading within elastic limit. It is permanent in nature and cannot be recovered after removal of load, hence is plastic in nature.

6. If the material has different elastic properties in perpendicular directions, it is called _____________

a) Elastic

b) Isotropic

c) Orthotropic

d) Plastic

View Answer

Answer: c
Explanation: Isotropic material has the same elastic properties but ortho tropic material has the same.

7. Which one of the following pairs is NOT correctly matched?

a) Visco-elastic – small plastic zone

b) Orthotropic material – different properties in three perpendicular directions

c) Strain hardening material – stiffening effect felt at some stage

d) Isotropic material – same physical property in all directions at a point

View Answer

Answer: a
Explanation: Visco-elastic material exhibit a mixture of creep and elastic after effects at room temperature. Thus their behaviour is time dependent. Materials with different properties in different directions are called anisotropic. Orthotropic material is a special case of an anisotropic material in three mutually perpendicular directions. However, these are symmetric about any axis.
advertisement

8. The phenomenon of slow extension of materials having a constant load, I.e. increasing with the time is called

a) Creeping

b) Yielding

c) Breaking

d) None of the mentioned

View Answer

Answer: a
Explanation: The creeping is the phenomenon of deformation in materials which have been under load for several time. When the load is put on the material, initially it deforms but when the load is not removed, it causes a small amount of deformation which increases with time.
Strain Constants – 1

1. What will be the elastic modulus of a material if the Poisson's ratio for that material is 0.5?

a) Equal to its shear modulus

b) Three times its shear modulus

c) Four times its shear modulus

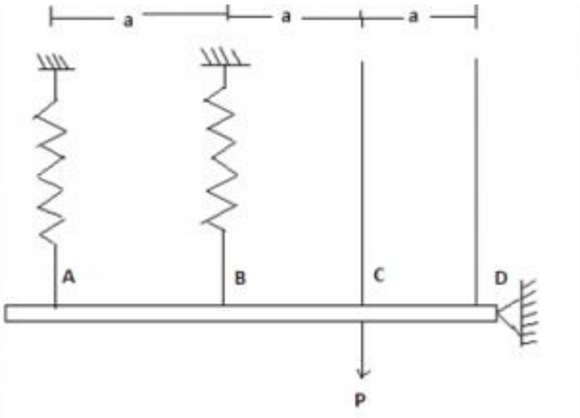
d) Not determinable

View Answer

Answer: b
Explanation:
Explanation: Elastic modulus = E
Shear modulus = G
$E = 2G (1 + \mu)$
Given, $\mu = 0.5$, $E = 2 \times 1.5 x G$
$E = 3G$.

2. A rigid beam ABCD is hinged at D and supported by two springs at A and B as shown in the given figure.

The beam carries a vertical load P and C. the stiffness of spring at A is 2K and that of B is K.



What will be the ratio of forces of spring at A and that of spring at B?

a) 4

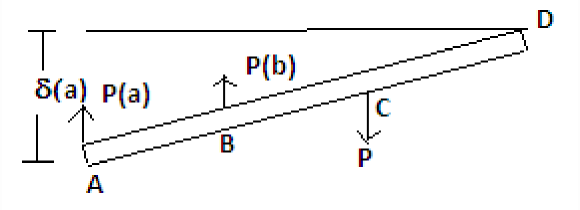
b) 3

c) 2

d) 1

View Answer

Answer: b
Explanation: The rigid beam will rotate about point D, due to the load at C.



From similar triangle,
$\delta_a/2a = \delta_b/3b$
Force in spring A/Force in spring B = Pa/Pb
= 2k/k x 3/2 = 3.

3. A solid metal bat of uniform diameter D and length L is hung vertically from a ceiling. If the density of the material of the bar is 1 and the modulus of elasticity is E, then the total elongation of the bar due to its own weight will be _____________

a) L/2E

b) $L^2/2E$

c) E/2L

d) $E/2L^2$

View Answer

Answer: b
Explanation: The elongation of bar due to its own weight is $\delta = WL/2AE$
Now $W = \rho AL$
There fore $\delta = L^2 / 2E$.

4. A bar of diameter 30mm is subjected to a tensile load such that the measured extension on a gauge length of 200mm is 0.09mm and the change in diameter is 0.0045mm. Calculate the Poissons ratio?

a) 1/3

b) 1/4

c) 1/5

d) 1/6

View Answer

Answer: a
Explanation: Longitudinal strain = 0.09/200
Lateral strain = – 0.0045/30
Poissons ratio = – lateral strain/ longitudinal strain
= 0.0045/30 x 200/0.09
= 1/3.

5. What will be the ratio of Youngs modulus to the modulus of rigidity of a material having Poissons ratio 0.25?

a) 3.75

b) 3.00

c) 1.5

d) 2.5

View Answer

Answer: d
Explanation: Modulus of rigidity, G = E/2(1 + μ)
Therefore, E/G = 2x(1+0.25) = 2.5.

6. An experiment was done and it was found that the bulk modulus of a material is equal to its shear modulus.

Then what will be its Poissons ratio?

a) 0.125

b) 0.150

c) 0.200

d) 0.375

View Answer

Answer: a
Explanation: We know that, μ = (3K – 2G) / (6K + 2G)
Here K = G
Therefore, μ = 3-2 / 6+2 = 0.125.

7. A bar of 40mm dia and 40cm length is subjected to an axial load of 100 kN. It elongates by 0.005mm.

Calculate the Poissons ratio of the material of bar?

a) 0.25

b) 0.28

c) 0.30

d) 0.33

View Answer

Answer: d
Explanation: Longitudinal strain = 0.150/400 = 0.000375
Lateral strain = – 0.005/40 = -0.000125
Poissons ratio = – lateral strain/longitudinal strain
= 0.33.
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8. What will be the approximate value of shear modulus of a material if the modulus of elasticity is 189.8 GN/m2 and its Poissons ratio is 0.30?

a) 73 GN/m^2

b) 80 GN/m^2

c) 93.3 GN/m^2

d) 103.9 GN/m^2

View Answer

Answer: a
Explanation: The relationship between E, G, and μ is given by
is given by
$E = 2G (1 + \mu)$
$G = 189.8 / 2(1 + 0.30)$
$G = 73\ GN/m^2$.

9. What will be the modulus of rigidity if the value of modulus of elasticity is 200 and Poissons ratio is 0.25?

a) 70

b) 80

c) 125

d) 250

View Answer

Answer: b
Explanation: The relationship between E, G and μ is $E = 2G (1 + \mu)$
$G = 200 / 2(1 + 0.25)$
$G = 80$.

Strain Constants – 2

1. A circular rod of dia 30 mm and length 200mm is extended to 0.09mm length and 0.0045 diameters through a tensile force. What will be its Poissons ratio?

a) 0.30

b) 0.31

c) 0.32

d) 0.33

View Answer

Answer:d
Explanation: Poissons ratio = lateral strain / longitudinal strain
$= \delta D/D \times L/\delta L$
$= 0.0045/30 \times 200/0.09$
$= 0.33$.

2. The Poissons ratio of a material is 0.3. what will be the ratio of Youngs modulus to bulk modulus?

a) 1.4

b) 1.2

c) 0.8

d) 0.6

View Answer

Answer: b
Explanation: As we know $E = 3k(1- 2\mu)$
So $E/K = 3(1-2\times0.3) = 1.2$.

3. What is the bulk modulus of elasticity?

a) The ratio of shear stress to shear strain

b) The ratio of direct stress to direct strain

c) The ratio of volumetric stress to volumetric strain

d) The ratio of direct stress to volumetric strain

View Answer

Answer: d
Explanation: When a body is subjected to the mutually perpendicular like and equal direct stresses, the ratio of direct stress to the corresponding volumetric strain strain is found to be constant for a given material when the deformation is within a certain limit. This ratio is known as the bulk modulus.

4. For a material, Youngs modulus is given as 1.2×10^5 and Poissons ratio 1/4. Calculate the bulk modulus.

a) 0.7×10^5

b) 0.8×10^5

c) 1.2×10^5

d) 1.2×10^5

View Answer

Answer: b
Explanation: The bulk modulus is given as $K = E/3(1 – 2\mu)$
$= 1.2 \times 10^5/3(1 – 2/4)$
$= 0.8 \times 10^5$.

5. Determine the Poissons ratio and bulk modulus of a material, for which Youngs modulus is 1.2 and modulus of rigidity is 4.8.

a) 7

b) 8

c) 9

d) 10

View Answer

Answer: b
Explanation: As we know, $E = 2C(1 + \mu)$
$\mu= 0.25$
$K = E / 3(1 – 2\mu)$
$= 8$.

6. The Youngs modulus of elasticity of a material is 2.5 times its modulus of rigidity. Then what will be its Poissons ratio?

a) 0.25

b) 0.33

c) 0.50

d) 0.60

View Answer

Answer: a
Explanation: As we know $E = 2G(1 + \mu)$ so putting the values of $E = 2.5G$ then we get $\mu= 0.25$.

7. How the elastic constants E and K are related?

a) $E = 2K(1 – 2\mu)$

b) $E = 3K(1 – 2\mu)$

c) $E = 2K(1 – \mu)$

d) $E = K(1 – 2\mu)$

View Answer

Answer: b
Explanation: As $E = 2G(1 + \mu) = 3K(1 – 2\mu)$.

8. How many elastic constants does an isotropic, homogeneous and linearly elastic material have?

a) 1

b) 2

c) 3

d) 4

View Answer

Answer: b
Explanation: E, G, K represents the elastic modulus, shear modulus, bulk modulus and poisson's ratio respectively of a linearly elastic, isotropic and homogeneous material. To express the stress-strain relations completely for this material at least any two of the four must be known, $E = 2G(1 + \mu) = 3K(1 – 2\mu) = 9KG / (3K + G)$.

9. The modulus of rigidity and the modulus of elasticity of a material are 80 GPa and 200 GPa. What will be the Poissons ratio of the material?

a) 0.25

b) 0.30

c) 0.40

d) 0.50

View Answer

Answer: a
Explanation: As $E = 2G(1 + \mu)$ putting $E = 200$ and $G = 80$ we get $\mu = 0.25$.

10. Which of the following is true if the value of Poisson's ratio is zero?

a) The material is rigid

b) The material is perfectly plastic

c) The longitudinal strain in the material is infinite

d) There is no longitudinal strain in the material

View Answer

Answer: a
Explanation: If the Poissons ratio is zero then the material is rigid.
Elastic Constants Relationship – 1

1. How many elastic constants of a linear, elastic, isotropic material will be?

a) 2

b) 3

c) 1

d) 4

View Answer

Answer: a
Explanation: Isotropic materials have the same properties in all directions. The number of independent elastic constants for such materials is 2. out of E, G, K, and μ, if any two constants are known for any linear elastic and isotropic material than rest two can be derived. Examples are steel, aluminium, copper, gold.
Orthotropic materials refer to layered structure such as wood or plywood. The number of independent elastic constants for such materials is 9.
Non isotropic or anisotropic materials have different properties in different directions. They show non-homogeneous behaviour. The number of elastic constants is 21.

2. How many elastic constants of a non homogeneous, non isotropic material will be?

a) 9

b) 15

c) 20

d) 21

View Answer

Answer: d
Explanation: Non isotropic or anisotropic materials have different properties in different directions. They show non- homogeneous behaviour. The number of elastic constants is 21.

3. How can be the Poissons ratio be expressed in terms of bulk modulus(K) and modulus of rigidity(G)?

a) (3K – 4G) / (6K + 4G)

b) (3K + 4G) /(6K – 4G)

c) (3K – 2G) / (6K + 2G)

d) (3K + 2G) / (6K – 2G)

View Answer

Answer: c
Explanation: There are four elastic modulus relationships. the relation between Poissons ration, bulk modulus and modulus of rigidity is given as
$\mu = (3K - 2G) / (6K + 2G)$.

4. Calculate the modulus of resilience for a 2m long bar which extends 2mm under limiting axial stress of 200 N/mm^2?

a) 0.01

b) 0.20

c) 0.10

d) 0.02

View Answer

Answer: c
Explanation: Modulus of resilience = $f^2/2E$
= 200×2/2×2000
= 0.10.

5. In an experiment, the bulk modulus of elasticity of a material is twice its modulus of rigidity. The Poissons ratio of the material is ___________

a) 1/7

b) 2/7

c) 3/7

d) 4/7

View Answer

Answer: b
Explanation: As we know, $\mu = (3K - 2G) / (6K + 2G)$
Given $K = 2G$
Then, $\mu = (6G - 2G) / (12G + 2G) = 4/14 = 2/7$.

6. What will be the value of the Poisson's ratio if the Youngs modulus E is equal to the bulk modulus K?

a) 1/2

b) 1/4

c) 1/3

d) 3/4

View Answer

Answer: c
Explanation: $K = E / 3(1 - 2\mu)$
Since $K = E$
So $(1-2\mu) = 1/3$
Therefore, $\mu = 1/3$.

7. What is the expression for modulus of rigidity in terms of modulus of elasticity and the Poissons ratio?

a) $G = 3E / 2(1 + \mu)$

b) $G = 5E / (1 + \mu)$

c) $G = E / 2(1 + \mu)$

d) $G = E / (1 + 2\mu)$

View Answer

Answer: c
Explanation: The relation between the modulus of rigidity, modulus of elasticity and the Poissons ratio is given as
$G = E / 2(1 + \mu)$.

8. What is the relationship between Youngs modulus E, modulus of rigidity C, and bulk modulus K?

a) $E = 9KC / (3K + C)$

b) $E = 9KC / (9K + C)$

c) $E = 3KC / (3K + C)$

d) $E = 3KC / (9K + C)$

View Answer

Answer: a
Explanation: The relationship between E, K, C is given by
$E = 9KC / (3K + C)$.

9. What is the limiting values of Poisson's ratio?

a) -1 and 0.5

b) -1 and -0.5

c) -1 and -0.5

d) 0 and 0.5

View Answer

Answer: d
Explanation: The value of Poisson□s ratio varies from 0 to 0.5. For rubber, its value ranges from.45 to 0.50.

10. What is the relationship between modulus of elasticity and modulus of rigidity?

a) C = E / 2(1 + μ)

b) C = E / (1 + μ)

c) C = 2E / (1 + μ)

d) C = 2E / 2(1 + μ)

View Answer

Answer: c
Explanation: The relation is given by calculating the tensile strain of square block is given by taking tensile strain in a diagonal. On equating that stains we get the relation,
C = E / 2(1 + μ).

Elastic Constants Relationship – 2

1. What is the ratio of Youngs modulus E to shear modulus G in terms of Poissons ratio?

a) 2(1 + μ)

b) 2(1 – μ)

c) 1/2 (1 – μ)

d) 1/2 (1 + μ)

View Answer

Answer: a
Explanation: As we know G = E / 2(1 +μ) so this gives the ratio of E to G = 2(1 + μ).

2. The relationship between Youngs modulus E, bulk modulus K if the value of Poissons ratio is unity will be ___________

a) E = -3K

b) K = -3E

c) E = 0

d) K = 0

View Answer

Answer: a
Explanation: As E = 2G(1 + μ) putting μ=1 we get E = -3K.

3. A rod of length L and diameter D is subjected to a tensile load P. which of the following is sufficient to calculate the resulting change in diameter?

a) Youngs modulus

b) Poissons ratio

c) Shear modulus

d) Both Youngs modulus and shear modulus

View Answer

Answer: a
Explanation: For longitudinal strain we need Youngs modulus and for calculating transverse strain we need Poisson's ratio. We may calculate Poissons ratio from $E = 2G(1 + \mu)$ for that we need shear modulus.

4. E, G, K and μ elastic modulus, shear modulus, bulk modulus and Poisson's ratio respectively. To express the stress strain relations completely for this material, at least __________

a) E, G and μmust be known

b) E, K and μmust be known

c) Any two of the four must be known

d) All the four must be known

View Answer

Answer: c
Explanation: As $E = 2G(1 + \mu) = 3K(1 – 2\mu) = 9KG / (3K + G)$, if any two of these four are known, the other two can be calculated by the relations between them.

5. Youngs modulus of elasticity and Poissons ratio of a material are 1.25×10^2 MPa and 0.34 respectively. The modulus of rigidity of the material is __________

a) 0.9469 MPa

b) 0.8375 MPa

c) 0.4664 MPa

d) 0.4025 MPa

View Answer

Answer: c
Explanation: As $E = 2G(1 + \mu)$
$1.25 \times 10^2 = 2G(1 + 0.34)$
$G = 0.4664 \times 10^2$ MPa.

6. If E,G and K have their usual meanings, for an elastic material, then which one of the following be possibly true?

a) G = 2K

b) G = K

c) K = E

d) G = E = K

View Answer

Answer: c
Explanation: As $E = 2G(1 + \mu) = 3K(1 – 2\mu) = 9KG / (3K + G)$
The value of μ must be between 0 to 0.5, so as E never equal to G but if $\mu = 1/3$, then E=K.

7. If a material had a modulus of elasticity of 2.1 kgf/cm^2 and a modulus of rigidity of 0.8 kgf/cm^2 then what will be the approximate value of the Poissons ratio?

a) 0.26

b) 0.31

c) 0.47

d) 0.43

View Answer

Answer: b
Explanation: On using E = 2G(1 + μ) we can put the values of E and G to get the Poissons value.

8. Consider the following statements:

X. Two-dimensional stresses applied to a thin plater in its own plane represent the plane stress condition.

Y. Normal and shear stresses may occur simultaneously on a plane.

Z. Under plane stress condition, the strain in the direction perpendicular to the plane is zero.

Which of the above statements are correct?

a) 2 only

b) 1 and 2

c) 2 and 3

d) 1 and 3

View Answer

Answer: d
Explanation: Under plane stress condition, the strain in the direction perpendicular to the plane is not zero. It has been found experimentally that when a body is stressed within the elastic limit, the lateral strain bears a constant ratio to the linear strain.

9. What is the relationship between the linear elastic properties Youngs modulus, bulk modulus and rigidity modulus?

a) 1/E = 9/k + 3/G

b) 9/E = 3/K + 1/G

c) 3/E = 9/K + 1/G

d) 9/E = 1/K + 3/G

View Answer

Answer: d
Explanation: We can use E = 2G(1 + μ) = 3K(1 – 2μ) = 9KG / (3K + G) to get the relation between E, K and G.

10. Which of the relationship between E, G and K is true, where E, G and K have their usual meanings?

a) E = 9KC / (3K + C)

b) E = 9KC / (9K + C)

c) E = 3KC / (9K + C)

d) E = 3KC / (3K + C)

View Answer

Answer: a
Explanation: As we know E = 2G(1 + μ) = 3K(1 – 2μ) = 9KG / (3K + G).
Normal & Shear Stress

1. In the given figure a stepped column carries loads. What will be the maximum normal stress in the column at B in the larger diameter column if the ratio of P/A here is unity?

a) 1/1.5

b) 1

c) 2/1.5

d) 2

View Answer

Answer: c
Explanation: Normal stress at B = Total load acting at B / Area of a cross-section at B
= (P + P) / 1.5 A = 2P/ 1.5A = 2/1.5.

2. The stress which acts in a direction perpendicular to the area is called _____________

a) Shear stress

b) Normal stress

c) Thermal stress

d) None of the mentioned

View Answer

Answer: b
Explanation: Normal stress acts in a direction perpendicular to the area. Normal stress is of two types tensile and compressive stress.

3. Which of these are types of normal stresses?

a) Tensile and compressive stresses

b) Tensile and thermal stresses

c) Shear and bending

d) Compressive and plane stresses

View Answer

Answer: a
Explanation: The normal stress is divided into tensile stress and compressive stress.

4. In a body loaded under plane stress conditions, what is the number of independent stress components?

a) 1

b) 2

c) 3

d) 6

View Answer

Answer: c
Explanation: In a body loaded under plane stress conditions, the number of independent stress components is 3 I.e. two normal components and one shear component.

5. If a bar of large length when held vertically and subjected to a load at its lower end, its won-weight produces additional stress. The maximum stress will be _____________

a) At the lower cross-section

b) At the built-in upper cross-section

c) At the central cross-section

d) At every point of the bar

View Answer

Answer: b
Explanation: The stress is the load per unit area. After the addition of weight in the bar due to its loading on the lower end the force will increase in the upper cross-section resulting in the maximum stress at the built-in upper cross-section.

6. Which type of stress does in a reinforcement bar is taken by the concrete?

a) Tensile stress

b) Compressive stress

c) Shear stress

d) Bending stress

View Answer

Answer: b
Explanation: Concrete has the property of taking a good amount of compressive stress. So, In the reinforcement bar, the compressive stress is taken by the concrete.

7. A material has a Poisson's ratio of 0.5. If uniform pressure of 300GPa is applied to that material, What will be the volumetric strain of it?

a) 0.50

b) 0.20

c) 0.25

d) Zero

View Answer

Answer: d
Explanation: As volumetric strain = $(1-2\mu)\sigma/E$
Here the value of μ is 0.5 so $1 - 2 * 0.5$ becomes zero.
Therefore whatever be the stress the value of volumetric strain will be zero.

8. A diagram which shows the variations of the axial load for all sections of the pan of a beam is called

____

a) Bending moment diagram

b) Shear force diagram

c) Thrust diagram

d) Stress diagram

View Answer

Answer: d
Explanation: The stress diagram shows the variation of the axial load for all sections of the pan. The bending moment diagram shows the variation of moment in a beam. The shear force diagram shows the variation in the shear force due to loading in the beam.

9. The stress induced in a body, when subjected to two equal and opposite forces which are acting tangentially across the resisting section resulting the shearing of the body across its section is called _____________

a) Bending stress

b) Compressive stress

c) Shear strain

d) Shear stress

View Answer

Answer: d
Explanation: Shear stress makes the body to shear off across the section. It is tangential to the area over which it acts. The corresponding strain is the shear strain.

10. What is the formula for shear stress?

a) Shear resistance/shear area

b) Force/unit area

c) Bending strain/area

d) Shear stress/length

View Answer

Answer: a
Explanation: When force is applied, the twisting divides the body. The resistance is known as shear resistance and shear resistance per unit area is known as shear stress.
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11. Which of the following stresses are associated with the tightening of a nut on a bolt?

P. Crushing and shear stress in threads

Q. Bending stress due to the bending of bolt

R. Torsional shear stress due to frictional resistance between the nut and the bolt

Select the correct answer using the codes given below:

a) P and Q

b) P and R

c) Only P

d) Only R

View Answer

Answer: a
Explanation: Bending stress comes when there is some kind of eccentric load. Torsional stress will come when the nut is rotating. Shear stress will come in tightening of a nut on bolt.

12. The transverse shear stress acting in a beam of rectangular cross-section, subjected to a transverse shear load, is _____________

a) variable with maximum at the bottom of the beam

b) Variable with maximum at the top of the beam

c) Uniform

d) Variable with maximum on the neutral axis

View Answer

Answer: d
Explanation: Maximum value of shear stress at neutral axis is $\tau = 3/2\ \tau_{mean}$
So, transverse shear stress is variable with a maximum in the neutral axis.

13. A block 100mm x 100mm base and 10mm height. What will the direct shear stress in the element when a tangential force of 10kN is applied to the upper edge to a displacement 1mm relative to lower face?

a) 1Pa

b) 1MPa

c) 10MPa

d) 100Pa

View Answer

Answer: b
Explanation: Shear stress = 10kN / 100mmx100mm = 1 N/mm^2 = 1MPa.
Bending Stress

1. A beam is said to be of uniform strength, if ____________

a) B.M. is same throughout the beam

b) Shear stress is the same through the beam

c) Deflection is the same throughout the beam

d) Bending stress is the same at every section along its longitudinal axis

View Answer

Answer: d
Explanation: Beam is said to be uniform strength if at every section along its longitudinal axis, the bending stress is same.

2. Stress in a beam due to simple bending is ____________

a) Directly proportional

b) Inversely proportional

c) Curvilinearly related

d) None of the mentioned

View Answer

Answer: a
Explanation: The stress is directly proportional to the load and here the load is in terms of bending. So the stress is directly proportional to bending.

3. Which stress comes when there is an eccentric load applied?

a) Shear stress

b) Bending stress

c) Tensile stress

d) Thermal stress

View Answer

Answer: b
Explanation: When there is an eccentric load it means that the load is at some distance from the axis. This causes compression in one side and tension on the other. This causes bending stress.

4. What is the expression of the bending equation?

a) $M/I = \sigma/y = E/R$

b) $M/R = \sigma/y = E/I$

c) $M/y = \sigma/R = E/I$

d) $M/I = \sigma/R = E/y$

View Answer

Answer: a
Explanation: The bending equation is given by $M/I = \sigma/y = E/R$
where

M is the bending moment
I is the moment of inertia
y is the distance from neutral axis
E is the modulus of elasticity
R is the radius.

5. On bending of a beam, which is the layer which is neither elongated nor shortened?

a) Axis of load

b) Neutral axis

c) Center of gravity

d) None of the mentioned

View Answer

Answer: b
Explanation: When a beam is in bending the layer in the direction of bending will be In compression and the other will be in tension. One side of the neutral axis will be shortened and the other will be elongated.

6. The bending stress is _____________

a) Directly proportional to the distance of layer from the neutral layer

b) Inversely proportional to the distance of layer from the neutral layer

c) Directly proportional to the neutral layer

d) Does not depend on the distance of layer from the neutral layer

View Answer

Answer: a
Explanation: From the bending equation $M/I = \sigma/y = E/R$
Here stress is directly proportional to the distance of layer from the neutral layer.

7. Consider a 250mmx15mmx10mm steel bar which is free to expand is heated from 15C to 40C. what will be developed?

a) Compressive stress

b) Tensile stress

c) Shear stress

d) No stress

View Answer

Answer: d
Explanation: If we resist to expand then only stress will develop. Here the bar is free to expand so there will be no stress.
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8. The safe stress for a hollow steel column which carries an axial load of 2100 kN is 125 MN/m^2. if the external diameter of the column is 30cm, what will be the internal diameter?

a) 25 cm

b) 26.19cm

c) 30.14 cm

d) 27.9 cm

View Answer

Answer: b
Explanation: Area of the cross section of column = $\pi/4\ (0.30^2 – d^2)\ m^2$
Area = load / stress.
So, $\pi/4\ (0.30^2 – d^2)\ m^2 = 21 / 125$
d = 26.19cm.
Tensile Stress

1. During a tensile test on a ductile material _____________

a) Nominal stress at fracture is higher than the ultimate stress

b) True stress at fracture is higher than the ultimate stress

c) True stress a fracture is the same as the ultimate stress

d) None of the mentioned

View Answer

Answer: b
Explanation: In a ductile material, the true stress at fracture will be higher the ultimate stress.

2. When equal and opposite forces applied to a body, tend to elongate it, the stress so produced, is called _____________

a) Shear stress

b) Compressive stress

c) Tensile stress

d) Transverse stress

View Answer

Answer: c
Explanation: When subjected to two equal and opposite pulls as a result of which there is an increase in length. This produces tensile stress.

3. Which of the following stresses are associated with the tightening of a nut on a bolt?

P. Tensile stress due to the streching of bolt

Q. Bending stress due to the bending of bolt

R. Torsional shear stress due to frictional resistance between the nut and the bolt

Select the correct answer using the codes given below.

a) P and Q

b) P and R

c) Only p

d) R and Q

View Answer

Answer: a
Explanation: Bending stress comes when there is some kind of eccentric load. When nut is tightened, the bolt will pull itself and stretching will be there resulting in the tensile stress. Torsional stress will come when the nut is rotating.

4. In a tensile test, near the elastic limit zone _____________

a) Tensile stress increases in linear proportion to the stress

b) Tensile stress increases at a faster rate

c) Tensile stress decreases at a faster rate

d) None of the mentioned

View Answer

Answer: c
Explanation: The stress first decreases and then decreases before the strain hardening occurs. The decreases in the stress is due to the attraction between carbon molecules.

5. Match the following and give the correct code given in options:

List 1	**List 2**
A. Tensile test on CI	1. Plain fracture on a transverse plane
B. Tensile test on MS	2. Granular helecoidal fracture
C. Torsion test on CI	3. Cup and cone
	4. Granular fracture in a transverse plane

a) A – 1 B – 2 C – 4

b) A – 1 B – 4 C – 2

c) A – 3 B – 1 C – 2

d) A – 3 B – 4 C – 1

View Answer

Answer: d
Explanation: Tensile test on CI is done on cup and cone. Torsion test on MS is on plain fracture on a traverse plane.

6. The phenomenon of slow growth of strain under a steady tensile stress is called ____________

a) Yielding

b) Creeping

c) Breaking

d) None of the mentioned

View Answer

7. A rod 150cm long and of diameter 2cm is subjected to an axial pull of 20kN. What will be the stress?

a) 60 N/mm^2

b) 65 N/mm^2

c) 63.6 N/mm^2

d) 71.2 N/mm^2

View Answer

Answer: c
Explanation: The stress = load / area

Load = 20,000N
Area = $\pi/4$ (20)2 = 100π mm^2.

8. The stress in a rod is 70 N/mm^2 and the modulus of elasticity is 2 x 10^5 N/mm^2. what will be the strain in the rod?

a) 0.00052

b) 0.00035

c) 0.00030

d) 0.00047

View Answer

Answer: c
Explanation: As $E = \sigma/e$
Here, E = 2 * 10^5 N/mm^2
And, σ = 70 N/mm^2

9. What will be the minimum diameter of a steel wire, which is used to raise a load of 4000N if the stress in the rod is not to exceed 95 MN/m^2?

a) 6mm

b) 6.4mm

c) 7mm

d) 7.3mm

View Answer

Answer: d
Explanation: As stress = load / area
Area = load/stress
Also, area is $\pi/4$ D2 so $\pi/4$ D2 = 4000 / 95
And D = 7.32.
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10. A tensile test was conducted on mild steel bar. The load at elastic limit was 250kN and the diameter of the steel bar was 3cm. What will be the value of stress?

a) 35368 x 10^4 N/m^2

b) 32463 x 10^4 N/m^2

c) 35625 x 10^4 N/m^2

d) 37562 x 10^4 N/m^2

View Answer

Answer: a
Explanation: The stress = load / area
Load = 150 x 1000N
Area = $\pi/4$ $(0.03)^2$ m2.
Compressive Stress

1. For keeping the stress wholly compressive the load may be applied on a circular column anywhere within a concentric circle of diameter ______________

a) D/2

b) D/3

c) D/4

d) D/8

View Answer

Answer: c
Explanation: The load application on a circular column affects stress. If it is under D/4 the stress will be wholly compressive.

2. Consider two bars A and B of same material tightly secured between two unyielding walls. Coefficient of thermal expansion of bar A is more than that of B. What are the stresses induced on increasing the temperature?

a) Tension in both the materials

b) Tension in material A and compression in material B

c) Compression in material A and tension in material B

d) Compression in both the materials

View Answer

Answer:d
Explanation: Since both the supports are fixed and both bars will try to expand, so rise in temperature will cause compressive stresses in the bars.

3. What will be the unit of compressive stress?

a) N

b) N/mm

c) N/mm^2

d) Nmm

View Answer

Answer: c
Explanation: As the stress is the ratio of force to the area, so it will be N/mm^2. Here mm is normally used in its calculation most of the time.

4. A cast iron T section beam is subjected to pure bending. For maximum compressive stress to be 3 times the maximum tensile stress, centre of gravity of the section from flange side is ____________

a) h/2

b) H/3

c) H/4

d) 2/3h

View Answer

Answer: c
Explanation: H/4 when the applied moment is sagging. Otherwise, I.e. if the applied moment is hogging it is H/4. as in the options both are not given means we have to take hogging.

5. A solid circular shaft of diameter d is subjected to a torque T. the maximum normal stress induced in the shaft is ____________

a) Zero

b) $16T/\pi d^3$

c) $32T/\pi d^3$

d) None of the mentioned

View Answer

Answer: b
Explanation: The maximum torque transmitted by a circular solid shaft is obtained from the maximum shear stress induced at the outer surface of the solid shaft and given by $T = \pi D^3/16$ x normal stress,
So, normal stress = $16T/\pi d^3$.

6. When a rectangular beam is loaded transversely, the maximum compressive stress develops on

____

a) Bottom fibre

b) Top fibre

c) Neutral axis

d) Every cross-section

View Answer

Answer: b
Explanation: Loaded means loaded downwards. In that case, upper fibres will be compressed while lower will be expanded. Hence maximum compressive stress will be developed in top layer.

7. An axial residual compressive stress due to a manufacturing process is present on the outer surface of a rotating shaft subjected to bending. Under a given bending load, the fatigue of the shaft in the presence of the residual compressive stress is _____________

a) Decreased

b) Increases or decreased, depending on the external bending load

c) Neither decreased nor increased

d) Increases

View Answer

Answer: d
Explanation: From the Gerber's parabola that is the characteristic curve of the fatigue life of the shaft in the presence of the residual compressive stress. The fatigue life of the material is effectively increased by the introduction of compressive mean stress, whether applied or residual.
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8. A steel bar of 40mm x 40mm square cross-section is subjected to an axial compressive load of 200kN. If the length of the bar is 2m and E=200GPa, the elongation of the bar well be _____________

a) 1.25mm

b) 2.70mm

c) 4.05mm

d) 5.40mm

View Answer

Answer: a
Explanation: Elongation of the bar = Pl/AE = -200x103x 2000 / (1600 x 200 x 103) = -1.25
The minus sign here shows that the stress here is compressive.
Thermal Stress

1. The length, Young's modulus and coefficient of thermal expansion of bar P are twice that of bar Q. what will be the ration of stress developed in bar P to that in bar Q if the temperature of both bars is increased by the same amount?

a) 2

b) 8

c) 4

d) 16

View Answer

Answer: c
Explanation: Temperature Stress = EαδT
Stress in bar P / Stress in bar Q = (E_P / E_Q) x (α_P / α_Q) = 2×2 = 4.

2. A steel bar 600mm long and having 30mm diameter, is turned down to 25mm diameter for one fourth of its length. It is heated at 30 C above room temperature, clamped at both ends and then allowed to cool to room temperature. If the distance between the clamps is unchanged, the maximum stress in the bar (α = 12.5 x 10-6 per C and E = 200 GN/m^2) is

a) 25 MN/m^2

b) 40 MN/m^2

c) 50 MN/m^2

d) 75 MN/m^2

View Answer

Answer: d
Explanation: As temperature stress do not depend upon properties of cross section like length and area. They only depends upon properties of the material.
Therefore, σ=αEδT
= 12.5 x 10-6 x 200 x 10^3 x 30
= 75 MN/m^2.

3. A cube having each side of length p, is constrained in all directions and is heated unigormly so that the temperature is raised to T.C. What will be the stress developed in the cube?

a) δET / γ

b) δTE / (1 – 2γ)

c) δTE / 2 γ

d) δTE / (1 + 2γ)

View Answer

Answer: b
Explanation: δV/V = P / K = a^3 $(1 + aT)^3$ – a^3) / a^3
Or P / (E / 3(1-2γ)) = 3αT.

4. A steel rod 10mm in diameter and 1m long is heated from 20 to 100 degree celcius, E = 200 GPa and coefficient of thermal expansion is 12 $x10^{-6}$ per degree celcius. Calculate the thermal stress developed?

a) 192 MPa(tensile)

b) 212 MPa(tensile)

c) 192MPa(compressive)

d) 212 MPa(compressive)

View Answer

Answer: c
Explanation: $\alpha E\delta T$ = (12 x 10^{-6}) (200 x 10^{3}) (100-20) = 192MPa.

5. A cube with a side length of 1m is heated uniformly a degree celcius above the room temperature and all the sides are free to expand. What will be the increase in the volume of the cube? Consider the coefficient of thermal expansion as unity.

a) Zero

b) 1 m^3

c) 2 m^3

d) 3 m^3

View Answer

Answer: d
Explanation: Coefficient of thermal expansion = 3 x coefficient of volume expansion.

6. The thermal stress is a function of _____________

P. Coefficient of linear expansion

Q. Modulus of elasticity

R. Temperature rise

a) P and Q

b) Q and R

c) Only P

d) Only R

View Answer

Answer: d
Explanation: Stress in the rod is only due to temperature rise.

7. A steel rod is heated from 25 to 250 degree celcius. Its coefficient of thermal expansion is 10^{-5} and E = 100 GN/m^2. if the rod is free to expand, the thermal stress developed in it is:

a) 100 kN/m^2

b) 240 kN/m^2

c) Zero

d) Infinity

View Answer

Answer: c
Explanation: Thermal stress will only develop if the body is restricted.

8. Which one of the following pairs is NOT correctly matched?

a) Temperature strain with permitted expansion – ($\alpha Tl - \delta$)

b) Temperature thrust – (αTE)

c) Temperature stress – (αTEA)

d) Temperature stress with permitted expansion – E(αTl – δ) / l

View Answer

Answer: a
Explanation: Dimension analysis gives Temperature strain with permitted expansion – (αTl – δ)is wrong. In other options the dimensions are correctly matched.

9. A steel rod of length L and diameter D, fixed at both ends, is uniformly heated to a temperature rise of δT. The Youngs modulus is E and the coefficient of linear expansion is unity. The thermal stress in the rod is ____________

a) Zero

b) T

c) EδT

d) EδTL

View Answer

Answer: c
Explanation: As α = δl / l δT
So, δl = l x 1 x δT
And temperature strain = δl / l = δT
As E = stress / strain
Stress = E δT.

10. A uniform, slender cylindrical rod is made of a homogeneous and isotropic material. The rod rests on a frictionless surface. The rod is heated uniformly. If the radial and longitudinal thermal stress are represented by σ_x and σ_z, then ___________

a) $\sigma_x = 0$, $\sigma_y = 0$

b) σ_x not equal to 0, $\sigma_y = 0$

c) $\sigma_x = 0$, σ_y not equal to 0

d) σ_x not equal to 0, σ_y not equal to 0

View Answer

Answer: a
Explanation: We know that due to temperature changes, dimensions of the material change. If these changes in the dimensions are prevented partially or fully, stresses are generated in the material and if the changes in the dimensions are not prevented, there will be no stress set up. (Zero stresses).
Hence cylindrical rod Is allowed to expand or contract freely.
So, $\sigma_x = 0$ and $\sigma_y = 0$.
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11. which one of the following are true for the thermal expansion coefficient?

a) $\alpha_{aluminium} > \alpha_{brass} > \alpha_{copper} > \alpha_{steel}$

b) $\alpha_{brass} > \alpha_{aluminium} > \alpha_{copper} > \alpha_{steel}$

c) $\alpha_{copper} > \alpha_{steel} > \alpha_{aluminium} > \alpha_{brass}$

d) $\alpha_{steel} > \alpha_{aluminium} > \alpha_{brass} > \alpha_{copper}$

View Answer

Answer: a
Explanation: Aluminium has the largest value of thermal expansion coefficient, then brass and then copper. Steel among them has lowest value of thermal expansion coefficient.

12. The length, coefficient of thermal expansion and Youngs modulus of bar A are twice of bar B. If the temperature of both bars is increased by the same amount while preventing any expansion, then the ratio of stress developed in bar A to that in bar B will be ___________

a) 2

b) 4

c) 8

d) 16

View Answer

Answer: b
Explanation: Temperature Stress = $E\alpha\delta T$
So $\sigma_1 / \sigma_2 = E_1\alpha_1\delta T_1/E_2\alpha_2\delta T_2$
From question, α and E of bar A are double that of bar B.

Stress due to Materials Used and Their Applications

1. Which test is conducted to measure the ability of a material to resist scratching, abrasion, deformation and indentation?

a) Creep test

b) Fatigue test

c) Hardness test

d) Compression test

View Answer

Answer: c
Explanation: The ability of a material to resist scratching, abrasion, deformation and indentation is called hardness. So to measure this hardness test is used. it is generally expressed by Brinell, Rockwell or Vickers hardness numbers.

2. Which test is conducted to measure the endurance limit of the material?

a) Creep test

b) Fatigue test

c) Compression test

d) Hardness test

View Answer

Answer: b
Explanation: The fatigue test is used to design components subjected to varying load. It experimentally determines the endurance limit of the material.

3. What is the process in which the metal is cooled rapidly in water after heating the metal above the lower critical temperature to increase the hardness of the material?

a) Quenching

b) Tampering

c) Hardening

d) Annealing

View Answer

Answer: a
Explanation: Quenching is the process in which the metal is cooled rapidly in water after heating the metal above the lower critical temperature to increase the hardness of the material. Hardness is achieved during the quenching process depends on the amount of carbon content and cooling rate.

4. What is the process of heating the metal in the furnance to a temperature slightly above the upper critical temperature and cooling slowly In the furnance.

a) Quenching

b) Tampering

c) Annealing

d) Normalizing

View Answer

Answer: c
Explanation: Annealing is the process of heating the metal in the furnance to a temperature slightly above the upper critical temperature and cooling slowly In the furnance. It produces an even grain structure, reduces hardness and increases ductility usually at a reduction of strength.

5. Photo stress method is ___________

a) Stress analysis method

b) Creep test

c) Ultra violet test

d) None of the mentioned

View Answer

Answer: a
Explanation: Photo stress is a widely used full field technique for accurately measuring surface strains to determine the stresses in a part or structure during static of dynamic testing.

6. What is the factor of safety?

a) The ratio of total stress to the permissible stress

b) The ratio of ultimate stress to the permissible stress

c) The ratio of ultimate stress to the applied stress

d) The ratio of ultimate stress to the modulus of elasticity

View Answer

Answer: b
Explanation: The ratio of ultimate stress to the permissible or working stress is called the factor of safety. This factor of safety is kept in mind in designing any structure.

7. Which one of the following has the largest value of thermal coefficient?

a) Brass

b) Copper

c) Steel

d) Aluminium

View Answer

Answer: d
Explanation: Aluminium has the large value of thermal coefficient among them of value 24 x 10_{-6}. whereas brass and copper has 19×10^{-6} and 17×10<sup-6< sup="">.</sup-6<>
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8. Identify which factor may cause a lowered body temperature:

a) Infection

b) Stress

c) Shock

d) Exercise

View Answer

Answer: c
Explanation: Shock can cause the body temperature to drop, and so the cause of shock must be found. Other factors that can cause a lowered body temperature include: very young/old, serious haemorrhage, recovery from anesthesis and poisons.
Bars of Varying Sections

1. If a bar of two different length are in a line and P load is acting axially on them then what will be the change in length of the bar if the radius of both different lengths is same?

a) P/E x $(L_1 + L_2)$

b) PA/E x $(L_1 + L_2)$

c) P/EA x $(L_1 + L_2)$

d) E/PA x $(L_1 + L_2)$

View Answer

Answer: c
Explanation: Change in length of section 1 = PL_1/EA_1
Change in length of section 2 = PL_2/EA_2
Since diameter is same for both the sections, the respective area will be the same
Total change in length of bar = $PL_1/EA_1 + PL_2/EA_2$ = P/EA x $(L_1 + L_2)$.

2. If a bar of two sections of different diameters of same length are in a line and P load is acting axially on them then what will be the change in length of the bar?

a) PL/E x $(1/A_1 + 1/A_2)$

b) P/E x $(1/A_1 + 1/A_2)$

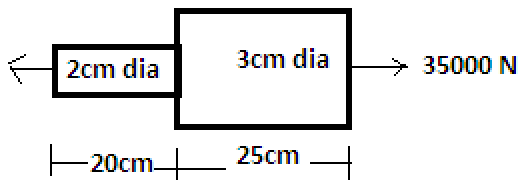
c) P/EL x $(1/A_1 + 1/A_2)$

d) PE/L x $(1/A_1 + 1/A_2)$

View Answer

Answer: a
Explanation: Change in length of section 1 = PL_1/EA_1
Change in length of section 2 = PL_2/EA_2
Since length is same for both the sections,
Total change length of bar = PL/E x $(1/A_1 + 1/A_2)$.

3. An axial pull of 35000 N is acting on a bar consisting of two lengths as shown with their respective dimensions. What will be the stresses in the two sections respectively in N/mm^2?



a) 111.408 and 49.5146

b) 111.408 and 17.85

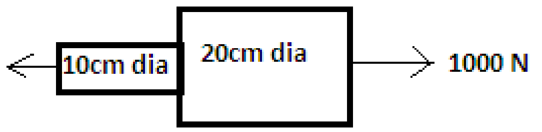
c) 97.465 and 49.5146

d) 97.465 and 34.263

View Answer

Answer: a
Explanation: The stress = P/A
Where P = 35000N and A is the respective cross section area of the sections.

4. An axial pull of 1kN is acting on a bar of consisting two equal lengths as shown but of dia 10cm and 20cm respectively. What will be the stresses in the two sections respectively in N/mm^2?



a) 0.127 and 0.0031

b) 0.034 and 0.0045

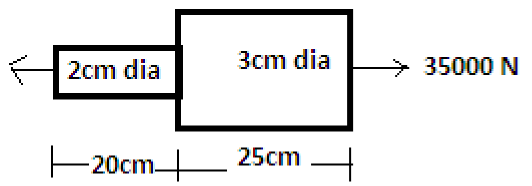
c) 0.153 and 0.003

d) 0.124 and 0.124

View Answer

Answer: a
Explanation: The stress = P/A
Where P = 1000N and A is the respective cross section area of the sections.

5. An axial pull of 35000 N on a bar consisting of two lengths as shown with their respective dimensions. What will be the total extension of the bar if the young's modulus = 2.1 x 10^5?



a) 0.153mm

b) 0.183mm

c) 0.197mm

d) 0.188mm

View Answer

Answer: b
Explanation: The total extension in the bar = P/E x ($L_1/A_1 + L_1/A_1$)
Where P = 35000 N, E = 2.1 x 10^5 N/mm^2, L_1 and L_2 are the 20cm and 25cm respectively and A_1 and A_2 are the area of both the sections respectively.

6. An axial pull of 20 kN on a bar of two equal lengths of 20cm as shown with their respective dimensions.

What will be the total extension of the bar if the young's modulus = 2×10^5?

a) 0.200mm

b) 0.345mm

c) 0.509mm

d) 0.486mm

View Answer

Answer: c
Explanation: The total extension in the bar = P/E x ($L_1/A_1 + L_1/A_1$)
Where P = 2 kN, E = 2 x 10^5 N/mm^2, L_1 and L_2 are same of 20cm and $A_1$and A_2 are the area of both the sections respectively.

7. Does the value of stress in each section of a composite bar is constant or not?

a) It changes in a relationship with the other sections as well

b) It changes with the total average length

c) It is constant for every bar

d) It is different in every bar in relation with the load applied and the cross sectional area

View Answer

Answer: d
Explanation: The value of stress in every section of a composite bar is given by P/A which is it is dependent on the load applied and the cross sectional area of the section. The value of stress in a section does not depend on the dimensions of other sections in the bar.

8. A composite bar of two sections of equal length and equal diameter is under an axial pull of 10kN. What will be the stresses in the two sections?

a) 3.18 N/mm^2

b) 2.21 N/mm^2

c) 3.45 N/mm^2

d) 2.14 N/mm^2

View Answer

Answer: a
Explanation: The stress = P/A
Where P = 1000N and A is the respective cross section area of the sections. Here the stress will be equal in both the sections as the dimensions are the same.

9. A composite bar of two sections of unequal length and equal diameter is under an axial pull of 10kN. What will be the stresses in the two sections?

a) 2.145 N/mm^2

b) 3.18 N/mm^2

c) 1.245 N/mm^2

d) 2.145 N/mm^2

View Answer

Answer: b
Explanation: The stress = P/A
Where P = 1000N and A is the respective cross section area of the sections. Here the stress will be equal in both the sections as the diameter is the same for both the sections. Even if the length is the variable it will not alter the stress value as the length does not depend on the stress.

10. A composite bar of two sections of equal length and given diameter is under an axial pull of 15kN. What will be the stresses in the two sections in N/mm^2?

a) 190.9 and 84.88

b) 190.9 and 44.35

c) 153.45 and 84088

d) 153045 and 44.35

View Answer

Answer: a
Explanation: The stress = P/A
Where P = 15000N and A is the respective cross section area of the sections.
Principle of Superposition

1. Which law states the when a number of loads are acting on a body, the resulting strain, according to principle of superposition, will be the algebraic sum of strains caused by individual loads?

a) Hooke's law

b) Principle of superposition

c) Lami's theorem

d) Strain law

View Answer

Answer: b
Explanation: The principle of superposition says that when a number of loads are acting on a body, the resulting strain, according to the principle of superposition, will be the algebraic sum of strains caused by individual loads.

2. How the total strain in any body subjected to different loads at different sections can be calculated?

a) The resultant strain is the algebraic sum of the individual strain

b) The resultant strain calculated by the trigonometry

c) The resultant will be through Lame's theorem

d) None of the mentioned

View Answer

Answer: a
Explanation: In a bar of different sections, the resultant strain is the algebraic sum of the individual stresses.

3. Three sections in a beam are of equal length of 100mm. All three sections are pulled axially with 50kN and due to it elongated by 0.2mm. What will be the resultant strain in the beam?

a) 0.002

b) 0.004

c) 0.006

d) 0.020

View Answer

Answer: c
Explanation: The strain = dL / L = 0.2/100 = 0.002
This strain will be for one section. By the principle of superposition the resultant strain will be the algebraic sum of individual strains I.e. = 0.002 + 0.002 + 0.002 = 0.006.

4. Two sections in a bar of length 10cm and 20cm respectively are pulled axially. It causes an elongation of 0.2mm and 0.4mm respectively in each section. What will be the resultant strain in the bar?

a) sd0.004

b) 0.002

c) 0.003

d) 0.006

View Answer

Answer: a
Explanation: The strain = dL / L
In column 1, strain = 0.2/100 = 0.002
In column 2, strain = 0.4/200 = 0.002
Resultant strain = 0.002 + 0.002 = 0.004.

5. A composite bar have four sections each of length 100mm, 150mm, 200mm, 250mm. When force is applied, all the sections causes an elongation of 0.1mm. What will the resultant strain in the bar?

a) 0.0012

b) 0.00154

c) 0.00256

d) 0.0020

View Answer

Answer: c
Explanation: Strain in section 1 = 0.1/100
Strain in section 2 = 0.1/150
Strain In section 3 = 0.1/200
Strain in section 4 = 0.1/250
Resultant strain = 0.001+0.0006+0.0005+0.0004 = 0.00256.

6. A brass bar, having cross sectional area of 100mm2, is subjected to axial force of 50kN. The length of two sections is 100mm and 200mm respectively. What will be the total elongation of bar if E = 1.05 x 105 N/mm2 ?

a) 1.21mm

b) 2.034mm

c) 2.31mm

d) 1.428mm

View Answer

Answer: d
Explanation: Elongation in section 1 = P/AE x L = 50,000/(100×1.05×100,000) x 100 = 0.476mm
Elongation In section 2 = P/AE x L = 50,000/(100×1.05×100,000) x 200 = 0.952mm
Total elongation = 0.476 + 0.952 = 1.428mm.

7. A composite bar having two sections of cross-sectional area $100mm^2$ and $200mm^2$ respectively. The length of both the sections is 100mm. What will be the total elongation of bar if it is subjected to axial force of 100kN and E = 105 N/mm^2?

a) 1.0

b) 1.25

c) 1.5

d) 2.0

View Answer

Answer: c
Explanation: Elongation in section 1 = 100,000 x 100 / 100000 x100 = 1
Elongation in section 2 = 100,000 x 100 / 100000x 200 = 0.5
Total elongation = 1 + 0.5 = 1.5mm.

8. A bar having two sections of cross sectional area of $100mm^2$ and $200mm^2$ respectively. The length of both the sections is 200mm. What will be the total strain in the bar if it is subjected to axial force of 100kN and E = 105 N/mm^2?

a) 0.010

b) 0.015

c) 0.020

d) 0.030

View Answer

Answer: b
Explanation: Strain in section 1 = P/AE = 100,000 / 100×100000 = 0.010
Strain is section 2 = P / AE = 100,000 / 200×100000 = 0.005
Resultant strain in the bar = 0.010 + 0.005 = 0.015mm.

9. A brass bar, having cross sectional area of $150mm^2$, is subjected to axial force of 50kN. What will be the total strain of bar if E= 1.05 x 104 N/mm^2?

a) 0.062mm

b) 0.025mm

c) 0.068mm

d) 0.054mm

View Answer

Answer: d
Explanation: Strain in section 1 = P/AE = 50,000/(100×1.05×100,000) = 0.031mm
Strain In section 2 = P/AE = 50,000/(100×1.05×100,000) = 0.031mm
Resultant strain = 0.031 + 0.031 = 0.062mm.
Here the calculation of strain does not requires the value of lengths of the sections.

10. A composite bar of two sections of each of length 100mm, 150mm. When force is applied, all the sections causes an elongation of 0.1mm. What will the resultant strain in the bar?

a) 0.0016

b) 0.00154

c) 0.00256

d) 0.0020

View Answer

Answer: a
Explanation: Strain in section 1 = 0.1/100
Strain in section 2= 0.1/150
Resultant strain = 0.001+0.0006 = 0.0016.
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11. If the given forces P_1, P_2, P_3, P_4,and P_5 which are co planar and concurrent are such that the force polygon does not close, then the system will

a) Be in equilibrium

b) Always reduce to a resultant force

c) Always reduce to a couple

d) Always be in equilibrium and will always reduce to a couple

View Answer

Answer: b
Explanation: For a system to be in equilibrium force polygon and funicular polygon must close. If the force polygon does not close then the forces will reduce to a resultant force. If funicular polygon does not close, then there is resultant moment on the system.
Bars of Composite Sections – 1

1. If a bar of sections of two different length and different diameters are in a line and P load is acting axially on them then what will be the change in length of the bar?

a) P/E x $(L_1 + L_2)$

b) P/E x $(A_1/L_1 + A_2/ L_2)$

c) P/E x $(L_1/A_1 + L_2/A_2)$

d) E/P x $(L_1/A_1 + L_2/A_2)$

View Answer

Answer: c
Explanation: Change in length of section 1 = PL_1/EA_1
Change in length of section 2 = PL_2/EA_2
Total change in length of bar = $PL1/EA_1 + PL_2/EA_2$.

2. How does the elastic constant varys with the elongation of body?

a) The elastic constant is directly proportional to the elongation

b) The elastic constant is directly proportional to the elongation

c) The elongation does not depends on the elastic constant

d) None of these

View Answer

Answer: b
Explanation: Elongation of a composite bar of two sections = P/E x $(L_1/A_1 + L_2/A_2)$
E is inversely proportional to bar elongation.

3. A composite rod is 1000mm long, its two ends are 40 mm^2 and 30mm^2 in area and length are 400mm and 600mm respectively. If the rod is subjected to an axial tensile load of 1000N, what will be its total elongation(E = 200GPa)?

a) 0.130m

b) 0.197mm

c) 0.160mm

d) 0.150mm

View Answer

Answer: a
Explanation: As elongation of a composite bar of two sections = P/E x ($L_1/A_1 + L_2/A_2$)
Putting L_1, L_2, A_1 and A_2 400mm$_2$, 600mm$_2$, 40mm$_2$ and 30mm$_2$ and P = 1000 and E = 200 x 10^3.

4. A mild steel wire 5mm in diameter and 1m ling. If the wire is subjected to an axial tensile load 10kN what will be its extension?

a) 2.55mm

b) 3.15mm

c) 2.45mm

d) 2.65mm

View Answer

Answer: a
Explanation: As change in length = PL/AE
P = 10x 1000N, L = 1m, A = $\pi d^2/4$ = 1.963 x 10^{-5} m^2, E = 200 x 10^9 N/m^2.

5. A composite rod is 1000mm long, its two ends are 40mm^2 and 30mm^2 in area and length are 300mm and 200mm respectively. The middle portion of the rod is 20mm^2 in area. If the rod is subjected to an axial tensile load of 1000N, what will be its total elongation (E = 200GPa)?

a) 0.145mm

b) 0.127mm

c) 0.187mm

d) 0.196mm

View Answer

Answer: d
Explanation: P = 1000N, Area A_1 = 40mm^2, A_2 = 20mm^2, $A_3$0 = 30mm^2
Length, L_1 = 300mm, L_2 = 500mm, L_3 = 200mm
E = 200GPa = 200x 1000 N/mm^2
Total extension = P/E x ($L_1/A_1 + L_2/A_2 + L_3/A_3$).

6. A rod of two sections of area 625mm^2 and 2500mm^2 of length 120cm and 60cm respectively. If the load applied is 45kN then what will be the elongation (E = 2.1x 105 N/mm^2)?

a) 0.462mm

b) 0.521mm

c) 0.365mm

d) 0.514mm

View Answer

Answer: a
Explanation: P = 45,000N, E =2.1x 105 N/mm^2,
Area, A_1 = 625mm^2, A_2 = 2500mm$_2$,

Length, L_1 = 1200mm, L_2 = 600mm
Elongation = P/E x ($L_1/A_1 + L_2/A_2$).

7. What will be the elongation of a bar of 1250mm^2 area and 90cm length when applied a force of 130kN if E = 1.05x 105 N/mm^2?

a) 0.947mm

b) 0.891mm

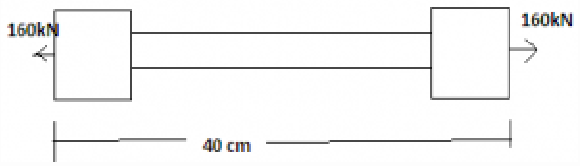
c) 0.845mm

d) 0.745mm

View Answer

Answer: b
Explanation: As change in length = PL/AE
P = 130x 1000N, L = 900mm, A = 1250 mm^2, E = 1.05 x 105 N/m^2.

8. A bar shown in diagram is subjected to load 160kN. If the stress in the middle portion Is limited to 150N/mm2, what will be the diameter of the middle portion?



a) 3.456 cm

b) 3.685 cm

c) 4.524 cm

d) 4.124 cm

View Answer

Answer: b
Explanation: Let L_2 and D_2 be the dimensions of the middle portion and L1 and D2 be the end portion dimensions.
For middle portion area = load / stress
This gives area by which diameter can be calculated.

9. A steel bar of 20mm x 20mm square cross-section is subjected to an axial compressive load of 100kN. If the length of the bar is 1m and E=200GPa, then what will be the elongation of the bar?

a) 1.25mm

b) 2.70mm

c) 5.40mm

d) 4.05mm

View Answer

Answer: a
Explanation: Elongation in bar = PL/ AE = (100x1000x1) / (0.2×0.2x200x10^6) = 1.25mm.

10. A solid uniform metal bar is hanging vertically from its upper end. Its elongation will be __________

a) Proportional to L and inversely proportional to D^2

b) Proportional to L^2 and inversely proportional to D

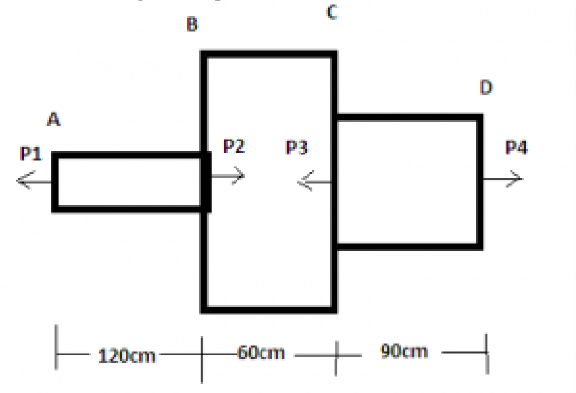
c) Proportional of U but independent of D

d) Proportional of L but independent of D

View Answer

Answer: a
Explanation: Elongation = WL / 2AE = 4WL / $2\pi D^2E$ α L/D^2.
Bars of Composite Sections – 2

1. A member ABCD is subjected to points load P_1=45kN, P_2, P_3=450kN and P_4=130kN. what will be the value of P necessary for equilibrium?



a) 350kN

b) 365kN

c) 375kN

d) 400kN

View Answer

Answer: b
Explanation: On resolving forces $P_1 + P_3 = P_2 + P_4$
So P_2 = 45 + 450 – 130 I.e. P_2 = 365kN.

2. A member ABCD is subjected to points load P_1=45kN, P_2, P_3=450kN and P_4=130kN. What will be the total elongation of the member, assuming the modulus of elasticity to be 2.1x105N/mm^2. The cross sectional area is 625mm, 2500mm, 1250mm respectively.

a) 0.4914mm

b) 0.4235mm

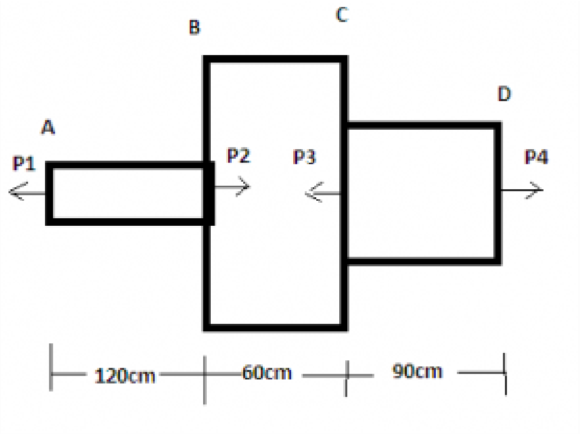
c) 0.4621mm

d) 0.4354mm

View Answer

Answer: a
Explanation: First of all the fores will be calculated
on resolving forces $P_1 + P_3 = P_2 + P_4$
So P_2 = 45 + 450 – 130 I.e. P_2 = 365kN
So forces on three sections will be 45kN, 320kN and 130kN respectively.
After that increase in length = PL/AE for all three sections will be calculated.

3. A tensile rod of 40kN is acting on a rod of diameter 40mm and of length 4m. a bore of diameter 20mm is made centrally on the rod. To what length the rod should be bored so that the total extension will increase 30% under the same tensile load if E = 2×105 N/mm^2?



a) 2m

b) 2.7m

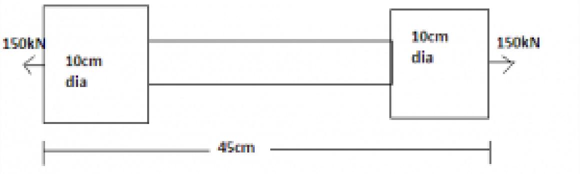
c) 3.2m

d) 3.6m

View Answer

Answer: d
Explanation: The extension = PL / AE = 2/π mm
Extension after the bore is made = 1.3x 2/π mm = 2.6/π mm
The extension after the bore is made, is also obtained by finding the extension of the un bored length and bored length.
Stress = load / area
So total extension after bore is made can have two equations which can be put equal and the length the rod should be bored up is calculated.

4. A bar is subjected to a tensile load of 150kN. If the stress in the middle portion is limited to 160 N/mm^2, what will be the diameter of the middle portion of the total elongation of the bar is 0.25cm (E= 2 x 105)?



a) 3cm

b) 3.45cm

c) 3.85cm

d) 4cm

View Answer

Answer: b
Explanation: Total extension = P/E x ($L_1/A_1 + L_2/A_2 + L_3/A_3$)
Only variable in the equation is A_2. after getting this the diameter of the section can be calculated.

5. A rod, which tapers uniformly from 5cm diameter to 3cm diameter in a length of 50cm, is subjected to an axial load of 6000N. if E = 2,00,000 N/mm^2, what will be the extension of the rod?

a) 0.00114cm

b) 0.00124cm

c) 0.00127cm

d) 0.00154cm

View Answer

Answer: c
Explanation: The extension in the rod = PL / Et(a-b) x loge (a/b)
Where a = 50mm, b = 30mm.

6. A bar is in two sections having equal lengths. The area of cross section of 1^{st} is double that of 2^{nd}. if the bar carries an axial load of P, then what will be the ratio of elongation in section 2nd to section 1st ?

a) 1/2

b) 2

c) 4

d) 1/4

View Answer

Answer: b
Explanation: Ratio of elongation in 2nd / ratio of elongation in 1st = L_2/L_1 x A_2/A_1
Since $L_1 = L_2$ and $A_1 = 2A_2$
Therefore, ratio = 1 x 2/1 = 2.

7. A round bar made of same material consists of 4 parts each of 100mm length having diameters of 40mm, 50mm, 60mm and 70mm, respectively. If the bar is subjected to an axial load of 10kN, what will be the total elongation of the bar in mm?

a) 0.4/πE (1/16 + 1/25 + 1/36 + 1/49)

b) 4/πE (1/16 + 1/25 + 1/36 + 1/49)

c) 2/πE (1/16 + 1/25 + 1/36 + 1/49)

d) 40/πE (1/16 + 1/25 + 1/36 + 1/49)

View Answer

Answer: d
Explanation: Total elongation = 4PL/πE ($1/d_1^2 + 1/d_2^2 + 1/d_3^2 + 1/d_4^2$)
= 4x10x100/πEx100 (1/16 + 1/25 + 1/36 + 1/49) mm
= 40/πE (1/16 + 1/25 + 1/36 + 1/49).
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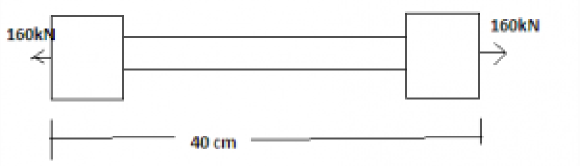
8. A bar shown in the diagram below is subjected to load 160kN. If the stress in the middle portion Is limited to $150N/mm^2$, what will be the length of the middle portion, if the total elongation of the bar is to be 0.2mm? Take E = 2.1 x 105 N/mm^2.



a) 18.45cm

b) 17.24cm

c) 16.45cm

d) 20.71cm

View Answer

Answer: d
Explanation: Let L_2 and D_2 be the dimensions of the middle portion and L_1 and D_2 be the end portion dimensions.
For middle portion area = load / stress
This gives area by which diameter can be calculated.
As Total extension = P/E x ($L_1/A_1 + L_2/A_2$)
This gives the value of L_2.

9. A composite bar consists of a bar enclosed inside a tune of another material when compressed under a load as whole through rigid collars at the end of the bar. What will be the equation of compatibility?

a) $W_1 + W_2 = W$

b) $W_1 + W_2 =$ constant

c) $W_1/A_1E_1 = W_2/A_2E_2$

d) $W_1/A_1E_2 = W_2/A_2E_1$

View Answer

Answer: a
Explanation: Compatibility equation insists that the change in length of the bar must be compatible with the boundary conditions. Here $W_1 + W_2 = W$ it is also correct but it is equilibrium equation.
Definition of Strain Energy

1. What is the strain energy stored in a body due to gradually applied load?

a) σE/V

b) $\sigma E^2/V$

c) $\sigma V^2/E$

d) $\sigma V^2/2E$

View Answer

Answer: d
Explanation: Strain energy when load is applied gradually = $\sigma^2V/2E$.

2. Strain energy stored in a body to uniform stress s of volume V and modulus of elasticity E is __________

a) $s^2V/2E$

b) sV/E

c) sV^2/E

d) sV/2E

View Answer

Answer: a
Explanation: Strain energy = $s^2V/2E$.

3. In a material of pure shear stress τthe strain energy stored per unit volume in the elastic, homogeneous isotropic material having elastic constants E and v will be:

a) τ^2/E x (1+ v)

b) τ^2/E x (1+ v)

c) $\tau^2/2E$ x (1+ v)

d) τ^2/E x (2+ v)

View Answer

Answer: a
Explanation: $\sigma_1=\tau$, $\sigma_2= -\tau\sigma_3=0$
$U = (\tau^2+- \tau^2-2\mu\tau(-\tau))V = \tau^2/E \times (1+ v)V$.

4. $PL^3/3EI$ is the deflection under the load P of a cantilever beam. What will be the strain energy?

a) $P^2L^3/3EI$

b) $P^2L^3/6EI$

c) $P^2L^3/4EI$

d) $P^2L^3/24EI$

View Answer

Answer: b
Explanation: We may do it taking average
Strain energy = Average force x displacement = (P/2) x $PL^3/3EI = P^2L^3/6EI$.

5. A rectangular block of size 400mm x 50mm x 50mm is subjected to a shear stress of 500kg/cm^2. If the modulus of rigidity of the material is 1×10^6 kg/cm^2, the strain energy will be ___________

a) 125 kg-cm

b) 1000 kg-cm

c) 500 kg-cm

d) 100 kg-cm

View Answer

Answer: a
Explanation: Strain energy stored = $\tau^2V/2G = 500^2/2\times10^6 \times 40\times5\times5 = 125$ kg-cm.

6. A material of youngs modulus and Poissons ratio of unity is subjected to two principal stresses σ_1 and σ_2 at a point in two dimensional stress system. The strain energy per unit volume of the material is ___________

a) $(\sigma_1^2 + \sigma_2^2 – 2\sigma_1\sigma_2) / 2E$

b) $(\sigma_1^2 + \sigma_2^2 + 2\sigma_1\sigma_2) / 2E$

c) $(\sigma_1^2 – \sigma_2^2 – 2\sigma_1\sigma_2) / 2E$

d) $(\sigma_1^2 – \sigma_2^2 – 2\sigma_1\sigma_2) / 2E$

View Answer

Answer: a
Explanation: Strain energy = $(\sigma_1\varepsilon_1+ \sigma_1\varepsilon_1) / 2E$
$= (\sigma_1^2 + \sigma_2^2 – 2\sigma_1\sigma_2) / 2E$.

7. If forces P, P and P of a system are such that the force polygon does not close, then the system will ___________

a) Be in equilibrium

b) Reduce to a resultant force

c) Reduce to a couple

d) Not be in equilibrium

View Answer

Answer: d
Explanation: The forces are not concurrent so the resultant force and couple both may be present. Thus the best choice is that forces are not in equilibrium.

8. The strain energy in a member is proportional to ___________

a) Product of stress and the strain

b) Total strain multiplied by the volume of the member

c) The maximum strain multiplied by the length of the member

d) Product of strain and Young's modulus of the material

View Answer

Answer: d
Explanation: Strain energy per unit volume for solid = q^2 / 4G.

9. A bar of cross-section A and length L is subjected to an axial load W. the strain energy stored in the bar would be ___________

a) WL / AE

b) W^2L / 4AE

c) W^2L / 2AE

d) WL / 4AE

View Answer

Answer: c
Explanation: Deformation in the bar = WL / AE
Strain energy = W/2 x WL / AE = W^2L / 2AE.

10. A tensile load of 60kN is gradually applied to a circular bar of 4cm diameter and 5m long. What is the stretch in the rod if E = 2×10^5 N/mm^2?

a) 1.1mm

b) 1.24mm

c) 2mm

d) 1.19mm

View Answer

Answer: d
Explanation: Stress = Load/ area = 60,000 / (π/4 D^2) = 470746 N/mm^2
So stretch = stress x length / E = 1.19mm.
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11. A tensile load of 50kN is gradually applied to a circular bar of 5cm diameter and 5m long. What is the strain energy absorbed by the rod (E = 200GPa)?

a) 14 N-m

b) 15.9 N-mm

c) 15.9 N-m

d) 14 N-mm

View Answer

Answer: c
Explanation: Stress = 50,000 / 625π = 25.46
Strain energy = $\sigma^2V/2E$ = 25.46×25.46×9817477 / (2×200000) = 15909.5 N-mm = 15.9 N-m.

12. A tensile load of 60kN is gradually applied to a circular bar of 4cm diameter and 5m long. What is the strain energy in the rod if the load is applied suddenly ($E = 2\times10^5$ N/mm^2)?

a) d143.23 N-m

b) 140.51 N-m

c) 135.145 N-m

d) 197.214 N-m

View Answer

Answer: a
Explanation: Maximum instantaneous stress = 2P / A = 95.493
Strain energy = $\sigma^2 V/2E$ = 143288N-mm = 143.238 N-m.

Resilience

1. The ability of a material to absorb energy when elastically deformed and to return it when unloaded is called

____

a) Elasticity

b) Resilience

c) Plasticity

d) Strain resistance

View Answer

Answer: b
Explanation: Resilience is the ability of a material to absorb energy when elastically deformed and to return it. Elasticity is the property by which any body regain its original shape.

2. The strain energy stored in a specimen when stained within the elastic limit is known as ___________

a) Resilience

b) Plasticity

c) Malleability

d) Stain energy

View Answer

Answer: a
Explanation: Resilience is the ability of a material to absorb energy when elastically deformed and to return it. Elasticity is the property by which any body regain its original shape. Malleability is the property by which any material can be beaten into thin sheets.

3. The maximum strain energy stored at elastic limit is ___________

a) Resilience

b) Proof resilience

c) Elasticity

d) Malleability

View Answer

Answer: b
Explanation: Proof resilience is the maximum stored energy at the elastic limit. Resilience is the ability of material to absorb energy when elastically deformed and to return it. Elasticity is the property by which any body regain its original shape. Malleability is the property by which any material can be beaten into thin sheets.

4. The mathematical expression for resilience ‘U’ is ___________

a) $U = \sigma^2/E$ x volume

b) $U = \sigma^2/3E$ x volume

c) $U = \sigma^2/2E$ x volume

d) $U = \sigma/2E$ x volume

View Answer

Answer: c
Explanation: The resilience is the strain energy stored in a specimen so it will be
$U = \sigma^2/2E$ x volume.

5. What is the modulus of resilience?

a) The ratio of resilience to volume

b) The ratio of proof resilience to the modulus of elasticity

c) The ratio of proof resilience to the strain energy

d) The ratio of proof resilience to volume

View Answer

Answer: d
Explanation: The modulus of resilience is the proof resilience per unit volume. It is denoted by σ.

6. The property by which an amount of energy is absorbed by material without plastic deformation is called

____

a) Toughness

b) Impact strength

c) Ductility

d) Resilience

View Answer

Answer: d
Explanation: Resilience is the ability of a material to absorb energy when elastically deformed and to return it when unloaded.

7. Resilience of a material plays important role in which of the following?

a) Thermal stress

b) Shock loading

c) Fatigue

d) Pure static loading

View Answer

Answer: b
Explanation: The total strain energy stored in a body is commonly known as resilience. Whenever the straining force is removed from the strained body, the body is capable of doing work. Hence the resilience is also define as the capacity of a strained body for doing work on the removal of the straining force.

8. A steel has its yield strength of $200N/mm^2$ and modulus of elasticity of 1x105MPa. Assuming the material to obey hookes law up to yielding, what will be its proof resilience?

a) $0.8\ N/mm^2$

b) $0.4\ N/mm^2$

c) 0.2 N/mm^2

d) 0.6 N/mm^2

View Answer

Answer: c
Explanation: Proof resilience = $\sigma^2/2E = (200)^2 / (2 \times 10^5) = 0.2\ N/mm^2$.

9. A 1m long bar of uniform section extends 1mm under limiting axial stress of 200N/mm^2. What is the modulus of resilience for the bar?

a) 0.1 units

b) 1 units

c) 10units

d) 100units

View Answer

Answer: a
Explanation: Modulus of resilience, $u = f^2/2E$, where $E = fL/\delta L$
Therefore, u = 200×1 / 2×1000 = 0.1units.

10. A square steel bar of 10mm side and 5m length is subjected to a load whereupon it absorbs a strain energy of 100J. what is its modulus of resilience?

a) 1/5 $N\text{-}mm/mm^3$

b) 25 $N\text{-}mm/mm^3$

c) 1/25 $N\text{-}mm/mm^3$

d) 5 $N\text{-}mm/mm^3$

View Answer

Answer: a
Explanation: Modulus of resilience is the strain energy stored in the material per unit volume.
u = U/v
= (100 x 1000) / (10 x 10x 5x 1000)
= 1/5 $N\text{-}mm/mm^3$.

Sudden Loading

1. What is the relation between maximum stress induced due to sudden loading to maximum stress the gradual loading?

a) Maximum stress in sudden load is equal to the maximum stress in gradual load

b) Maximum stress in sudden load is half to the maximum stress in gradual load

c) Maximum stress in sudden load is twice to the maximum stress in gradual load

d) Maximum stress in sudden load is four times to the maximum stress in gradual load

View Answer

Answer: c
Explanation: Maximum stress in sudden loading = 2P/A
Maximum stress in gradual loading = P/A.

2. What is the strain energy stored in a body when the load is applied suddenly?

a) $\sigma E/V$

b) $\sigma E^2/V$

c) $\sigma V^2/E$

d) $\sigma V^2/2E$

View Answer

Answer: d
Explanation: Strain energy in gradual loading = $\sigma^2V/2E$.

3. A tensile load of 60kN is suddenly applied to a circular bar of 4cm diameter. What will be the maximum instantaneous stress induced?

a) 95.493 N/mm^2

b) 45.25 N/mm^2

c) 85.64 N/mm^2

d) 102.45 N/mm^2

View Answer

Answer: a
Explanation: Maximum instantaneous stress induced = 2P/A = 2×60000/400π = 95.49 N/mm^2.

4. A tensile load of 60kN is suddenly applied to a circular bar of 4cm and 5m length. What will be the strain energy absorbed by the rod if E=2×105 N/mm^2?

a) 140.5 N-m

b) 100 N-m

c) 197.45 N-m

d) 143.2 N-m

View Answer

Answer: d
Explanation: Maximum instantaneous stress induced = 2P/A = 2×60000/400π = 95.49 N/mm^2
Strain energy = $\sigma^2V/2E$ = 95.492 x 2×106π / (2x2x105) = 143238 N-mm = 143.23 N-m.

5. A tensile load of 100kN is suddenly applied to a rectangular bar of dimension 2cmx4cm. What will be the instantaneous stress in bar?

a) 100 N/mm^2

b) 120 N/mm^2

c) 150 N/mm^2

d) 250 N/mm^2

View Answer

Answer: d
Explanation: Stress = 2x load / area = 2×100,000/ (20×40) = 250 N/mm^2.

6. 2 tensile load of 100kN is suddenly applied to a rectangular bar of dimension 2cmx4cm and length of 5m. What will be the strain energy absorbed in the bar if E=1×105 N/mm^2?

a) 312.5 N-m

b) 314500 N-mm

c) 1250 N-m

d) 634 N-m

View Answer

Answer: c
Explanation: Stress = 2xload / area = 2×100,000/ (20×40) = 250 N/mm^2
Strain energy = σ^2V/2E = 250x250x20x40x5000/ (2×100,000) = 1250000 N-mm = 1250 N-m.

7. A steel rod is 2m long and 50mm in diameter. A axial pull of 100kN is suddenly applied to the rod. What will be the instantaneous stress induced in the rod?

a) 101.89 N/mm^2

b) 94.25 N/mm^2

c) 130.45 N/mm^2

d) 178.63 N/mm^2

View Answer

Answer: a
Explanation: Area = π/4 d2 = 625π
Load = 100kN = 100×1000 N
Stress = 2 x load / area = 2x100x1000 / (625π) = 101.86 N/mm^2.

8. A steel rod is 2m long and 50mm in diameter. An axial pull of 100kN is suddenly applied to the rod. What will be the instantaneous elongation produced in the rod if E=22GN/m2?

a) 0.0097 mm

b) 1.0754 mm

c) 1.6354 mm

d) 1.0186 mm

View Answer

Answer: d
Explanation: Area = π/4 d2 = 625π
Load = 100kN = 100×1000 N
E=22GN/m^2 = 200 x 109 / 106 = 200,000 N/mm^2
Stress = 2 x load / area = 2x100x1000 / (625 π)
Elongation = stress x length / E = 101.86×2000 / 200000 = 1.0186 mm.

9. What will be the amount of axial pull be applied on a a 4cm diameter bar to get an instantaneous stress value of 143 N/mm^2?

a) 50kN

b) 60kN

c) 70kN

d) 80kN

View Answer

Answer: b
Explanation: Instantaneous stress = 2 x load / area
Load = instantaneous stress x area / 2
= 143 x 400×3.14 / 2 = 60kN.

10. What will be the instantaneous stress produced in a bar 10cm^2 in area ans 4m long by the sudden application of tensile load of unknown magnitude, if the extension of the bar due to suddenly applied load is 1.35mm if E = 2×105 N/mm^2?

a) 67.5 N/mm^2

b) 47 N/mm^2

c) 55.4 N/mm^2

d) 78.5 N/mm^2

View Answer

Answer: a
Explanation: The value of stress = load / area where area is $10cm^2$ and load can be calculated by stress strain equation.
Gradual Loading

1. What is the strain energy stored in a body when the load is applied gradually?

a) $\sigma E/V$

b) $\sigma E^2/V$

c) $\sigma V^2/E$

d) $\sigma V^2/2E$

View Answer

Answer: d
Explanation: Strain energy in gradual loading = $\sigma^2 V/2E$.

2. What is strain energy?

a) The work done by the applied load In stretching the body

b) The strain per unit volume

c) The force applied in stretching the body

d) The stress per unit are

View Answer

Answer: a
Explanation: The strain energy stored in a body is equal to the work done by the applied load in stretching the body.

3. What is the relation between maximum stress induced due to gradual load to maximum stress the sudden load?

a) Maximum stress in gradual load is equal to the maximum stress in sudden load

b) Maximum stress in gradual load is half to the maximum stress in sudden load

c) Maximum stress in gradual load is twice to the maximum stress in sudden load

d) Maximum stress in gradual load is four times to the maximum stress in sudden load

View Answer

Answer: b
Explanation: Maximum stress in gradual loading = P/A
Maximum stress in sudden loading = 2P/A.

4. A tensile load of 60kN is gradually applied to a circular bar of 4cm diameter and 5cm long. What will be the stress in the rod if $E=1\times10^5$ N/mm^2?

a) 47.746 N/mm^2

b) 34.15 N/mm^2

c) 48.456 N/mm^2

d) 71.02 N/mm^2

View Answer

Answer: a
Explanation: Stress = Load/ area = 60,000 / (π/4 D^2) = 47.746 N/mm^2.

5. A tensile load of 60kN is gradually applied to a circular bar of 4cm diameter and 10m long. What will be the stress in the rod if $E=1\times10^5$ N/mm^2?

a) 1.19mm

b) 2.14mm

c) 3.45mm

d) 4.77mm

View Answer

Answer: d
Explanation: Stress = Load/ area = 60,000 / (π/4 D^2) = 47.746 N/mm^2
So stretch = stress x length / E = 4.77mm.

6. A tensile load of 100kN is gradually applied to a rectangular bar of dimension 2cmx4cm. What will be the stress in bar?

a) 100 N/mm^2

b) 120 N/mm^2

c) 125 N/mm^2

d) 150 N/mm^2

View Answer

Answer: c
Explanation: Stress = load / area = 100,000/ (20×40) = 125 N/mm^2.

7. A tensile load of 100kN is gradually applied to a rectangular bar of dimension 2cmx4cm and length of 5m. What will be the strain energy in the bar if E=1×105 N/mm^2?

a) 312.5 N-m

b) 314500 N-mm

c) 245.5 N-m

d) 634 N-m

View Answer

Answer: a
Explanation: Stress = load / area = 100,000/ (20×40) = 125 N/mm^2
Strain energy = $\sigma^2V/2E$ = 125x125x20x40x5000/ (2×100,000) = 312500 N-mm = 312.5N-m.

8. A tensile load of 60kN is gradually applied to a circular bar of 4cm diameter and 10m long. What will be the strain energy absorbed by the rod if E=1×105 N/mm^2?

a) 100 N-m

b) 132 N-m

c) 148 N-m

d) 143.2 N-m

View Answer

Answer: d
Explanation: Stress = 60,000 / 400π = 47.746
Strain energy = $\sigma^2V/2E$ = 47.746×47.746×12,566,370 / (2×100000) = 143,236.54 N-mm = 143.2N-m.

9. A uniform bar has a cross sectional area of 700mm and a length of 1.5m. if the stress at the elastic limit is 160 N/mm, what will be the value of gradually applied load which will produce the same extension as that produced by the suddenly applied load above?

a) 100kN

b) 110kN

c) 112kN

d) 120kN

View Answer

Answer: c
Explanation: For gradually applied load, stress = load / area
Load = stress x area = 160 x 700 = 112000 N = 112kN.

10. A tension bar 6m long is made up of two parts, 4m of its length has cross sectional area of 12.5cm while the remaining 2m has 25cm. An axial load 5tonnes is gradually applied. What will be the total strain energy produced if E = 2 x 106 kgf/cm^2?

a) 240kgf/cm

b) 242kgf/cm

c) 264kgf/cm

d) 270kgf/cm

View Answer

Answer: b
Explanation: First stress = load /area, then the strain energy will be calculated as
Strain energy = $\sigma^2V/2E$.
Impact Loading

1. What is the strain energy stored in a body when the load is applied with impact?

a) σE/V

b) $\sigma E^2/V$

c) $\sigma V^2/E$

d) $\sigma V^2/2E$

View Answer

Answer: d
Explanation: Strain energy in impact loading = $\sigma^2V/2E$.

2. What is the value of stress induced in the rod due to impact load?

a) P/A $(1 + (1 + 2AEh/PL)^{1/2})$

b) P/A (2 + 2AEh/PL)

c) P/A $(1 + (1 + AEh/PL)^{1/2})$

d) P/A $((1 + 2AEh/PL)^{1/2})$

View Answer

Answer: a
Explanation: The value of stress is calculated by equating the strain energy equation and the work done equation.

3. What will be the stress induced in the rod if the height through which load is dropped is zero?

a) P/A

b) 2P/A

c) P/E

d) 2P/E

View Answer

Answer: b
Explanation: As stress = P/A $(1 + (1 + 2AEh/PL)^{1/2})$
Putting h=0, we get stress = 2P/A.

4. A weight of 10kN falls by 30mm on a collar rigidly attached to a vertical bar 4m long and $1000mm^2$ in section. What will be the instantaneous stress (E=210GPa)?

a) 149.4 N/mm^2

b) 179.24 N/mm^2

c) 187.7 N/mm^2

d) 156.1 N/mm^2

View Answer

Answer: c
Explanation: As stress = P/A $(1 + (1 + 2AEh/PL)^{1/2})$
Putting P = 10,000, h = 30, L = 4000, A = 1000, E = 210,000 we will get stress = 187.7 N/mm^2.

5. A load of 100N falls through a height of 2cm onto a collar rigidly attached to the lower end of a vertical bar 1.5m long and of $105cm^2$ cross- sectional area. The upper end of the vertical bar is fixed. What is the maximum instantaneous stress induced in the vertical bar if E = 200GPa?

a) 50.87 N/mm^2

b) 60.23 N/mm^2

c) 45.24 N/mm^2

d) 63.14 N/mm^2

View Answer

Answer: b
Explanation: As stress = P/A $(1 + (1 + 2AEh/PL)^{1/2})$
Putting P = 100, h = 20, L = 1500, A = 150, E = 200,000 we will get stress = 60.23 N/mm^2.

6. A weight of 10kN falls by 30mm on a collar rigidly attached to a vertical bar 4m long and $1000mm^2$ in section. What will be the strain (E=210GPa)?

a) 0.00089

b) 0.0005

c) 0.00064

d) 0.00098

View Answer

Answer: a
Explanation: As stress = P/A $(1 + (1 + 2AEh/PL)^{1/2})$

Putting P = 10,000, h = 30, L = 4000, A = 1000, E = 210,000 we will get stress = 187.7 N/mm^2
As strain = stress / E, thus, strain = 187.7 / 210,000 = 0.00089.

7. A load of 100N falls through a height of 2cm onto a collar rigidly attached to the lower end of a vertical bar 1.5m long and of 105cm2 cross- sectional area. The upper end of the vertical bar is fixed. What is the maximum instantaneous elongation in the vertical bar if E = 200GPa?

a) 0.245mm

b) 0.324mm

c) 0.452mm

d) 0.623mm

View Answer

Answer: c
Explanation: As stress = P/A (1 + (1 + 2AEh/PL)$^{1/2}$)
Putting P = 100, h = 20, L = 1500, A = 150, E = 200,000 we will get stress = 60.23 N/mm^2
Elongation = stress x length / E = 60.23 x 1500 / 200,000 = 0.452mm.

8. A load of 100N falls through a height of 2cm onto a collar rigidly attached to the lower end of a vertical bar 1.5m long and of 105cm^2 cross- sectional area. The upper end of the vertical bar is fixed. What is the strain energy stored in the vertical bar if E = 200GPa?

a) 2.045 N-m

b) 3.14 N-m

c) 9.4 N-mm

d) 2.14 N-m

View Answer

Answer: a
Explanation: As stress = P/A (1 + (1 + 2AEh/PL)$^{1/2}$)
Putting P = 100, h = 20, L = 1500, A = 150, E = 200,000 we will get stress = 60.23 N/mm^2.
Strain energy stored = stress^2 x volume / 2E = 60.232 x 2525000 / (2×200,000) = 2.045 N-m.

9. The maximum instantaneous extension, produced by an unknown falling weight in a vertical bar of length 3m. what will be the instantaneous stress induced in the vertical bar and the value of unknown weight if E = 200GPa?

a) 100 N/mm^2

b) 110 N/mm^2

c) 120 N/mm^2

d) 140 N/mm^2

View Answer

Answer: d
Explanation: Instantaneous stress = E x instantaneous strain = E x δL/L = 200,000x 2.1 / 3000 = 140N/mm^2.

10. The maximum instantaneous extension, produced by an unknown falling weight through a height of 4cm in a vertical bar of length 3m and of cross section area 5cm^2. what will be the instantaneous stress induced in the vertical bar and the value of unknown weight if E = 200GPa?

a) 1700 N

b) 1459.4 N

c) 1745.8 N

d) 1947.5 N

View Answer

Answer: c
Explanation: Instantaneous stress = E x instantaneous strain = E x $\delta L/L$ = 200,000x 2.1 / 3000 = 140N/mm^2.
As, $P(h + \delta L) = \sigma^2/2E \times V$
So P = 1745.8 N.
advertisement

11. An unknown weight falls through a height of 10mm on a collar rigidly attached to a lower end of a vertical bar 500cm long. If E =200GPa what will be the value of stress?

a) 50 N/mm^2

b) 60 N/mm^2

c) 70 N/mm^2

d) 80 N/mm^2

View Answer

Answer: d
Explanation: Stress = E x strain = E x $\delta L/L$ = 200,000 x 2 /5000 = 80 N/mm^2.

Center of Gravity

1. The point through which the whole weight of the body acts is called ______________

a) Inertial point

b) Center of gravity

c) Centroid

d) Central point

View Answer

Answer: b
Explanation: The centre of gravity of a body is the point through which the whole weight of the body acts. A body's center of gravity is the point around which the resultant torque due to gravity forces vanishes. Where a gravity field can be considered to be uniform and the centre of gravity will be the same.

2. The point at which the total area of a plane figure is asssumed to be concentrated is called _____________

a) Centroid

b) Centre of gravity

c) Central point

d) Inertial point

View Answer

Answer: a
Explanation: The centroid is the point at which the total area of a plane figure is assumed to be concentrated. The centroid and centre of gravity are at the same point.

3. Where will be the centre of gravity of a uniform rod lies?

a) At its end

b) At its middle point

c) At its centre of its cross sectional area

d) Depends upon its material

View Answer

Answer: b
Explanation: The centre of gravity of a uniform rod lies at its middle point. The whole weight of the rod acts through its middle point.

4. Where the center of gravity of a circle lies?

a) At its centre

b) Anywhere on its radius

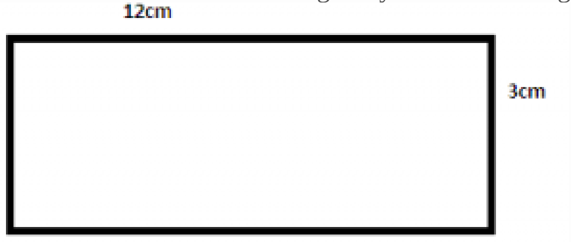
c) Anywhere on its circumference

d) Anywhere on its diameter

View Answer

Answer: a
Explanation: The whole weight of a circle can be assumed to act through its center. So the center of gravity of a circle is at its center.

5. Where will be the center of gravity of the following section will lie In coordinates?



a) (6,3)

b) (6,6)

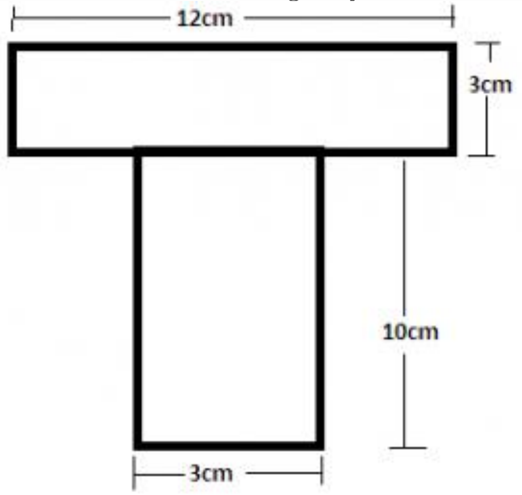
c) (6,1.5)

d) (1.5,3)

View Answer

Answer: c
Explanation: The centre of gravity of this rectangular area will be half of 3cm from x-axis and half of 12 from the y-axis. therefore the center of gravity will be at (6,1.5).

6. Where will be the centre of gravity of the T section shown in the figure?



a) At 8.545cm

b) At 6.5cm

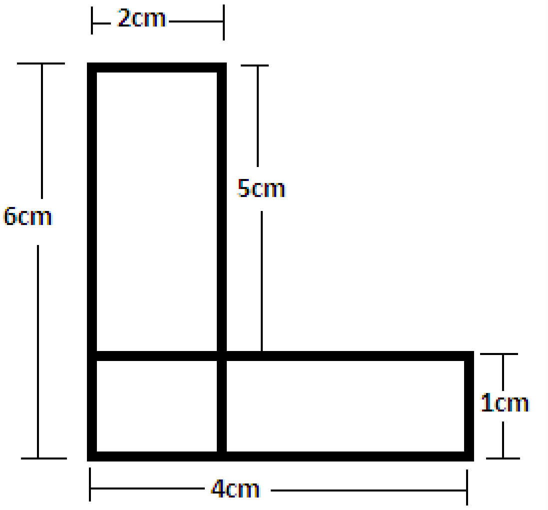
c) At 5cm

d) At 9.25cm

View Answer

Answer: a
Explanation: The center of gravity is given by, $y = (a_1y_1 + a_2y_2) / (a_1 + a_2) = (36\times11.5 + 30\times5) / (36+30) =$ 8.545cm.

7. Where will be the center of gravity of the L-section shown in the figure?



a) (1.28,2.64)

b) (1.45,3.24)

c) (1.64,3.28)

d) (2.24,3.68)

View Answer

Answer: a
Explanation: The center of gravity is given by, $y = (a_1y_1 + a_2y_2) / (a_1 + a_2) = (10\times3.5 + 4\times0.5) / (10+4) =$ 2.64cm.
This will on for the y-axis.
For the x-axis, The center of gravity is given by, $x = (a_1x_1 + a_2x_2) / (a_1 + a_2) = (0x1 + 4\times2) / (10+4) =$ 1.28cm.
So the center of gravity will be at (2.33, 4.33).
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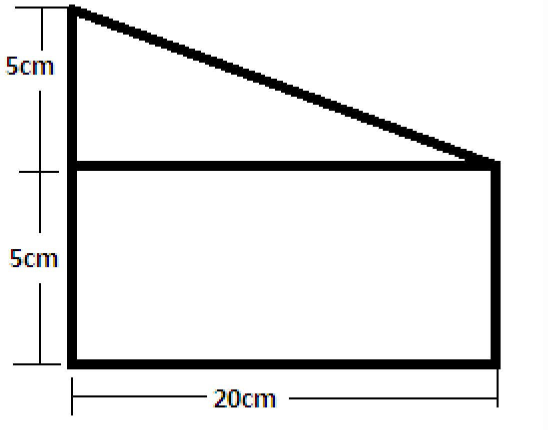
8. Where will be the center of gravity of the figure shown ?



a) (3.45,4.52)

b) (3.59,7.42)

c) (3.66,8.84)

d) (3.88,8.88)

View Answer

Answer: b
Explanation: Area of triangle = 50, area of rectangle = 100
The center of gravity is given by, $y = (a_1y_1 + a_2y_2) / (a_1 + a_2) = (50×20/3 + 100×10) / (50+100) = 8.88$cm.
This will on for the y-axis.
For the x-axis, The center of gravity is given by, $x = (a_1x_1 + a_2x_2) / (a_1 + a_2) = (50×6.66 + 100×2.5) / (50+100) = 3.88$cm.
So the center of gravity will be at (2.33, 4.33).

9. Where will be the center of gravity of an I section will be if the dimension of upper web is 2x10cm, lower web is 2×20 and that of flange is 2x15cm If the y-axis will pass through the center of the section?

a) 7.611cm

b) 9.51cm

c) 9.31cm

d) 11.5cm

View Answer

Answer: b
Explanation: The center of gravity is given by, $y = (a_1y_1 + a_2y_2 + a_3y_3) / (a_1 + a_2 + a_3) = (20×18 + 30×9.5 + 40×1 / (20 +30+40) = 1.611$cm.

Center of Gravity of Section

1. The center of gravity of the rod shown in figure will be _____________

a) 5cm

b) 10cm

c) 15cm

d) 20cm

View Answer

Answer: b
Explanation: The center of gravity of a rod will be on its center. Here it will be at 10cm.

2. The center of gravity of a circle of radius 10 cm will be ______________

a) At its center of the diameter

b) At the center of the radius

c) Anywhere on the circumference

d) Anywhere in its area

View Answer

Answer: a
Explanation: The whole weight of a circle can be assumed to act through its center. So the center of gravity of a circle is at its center. Whatever may be the radius of the circle the center of gravity will be on its center.

3. A rectangle has dimension of 10cm x 20cm. where will be its center of gravity?

a) (10,10)

b) (20,5)

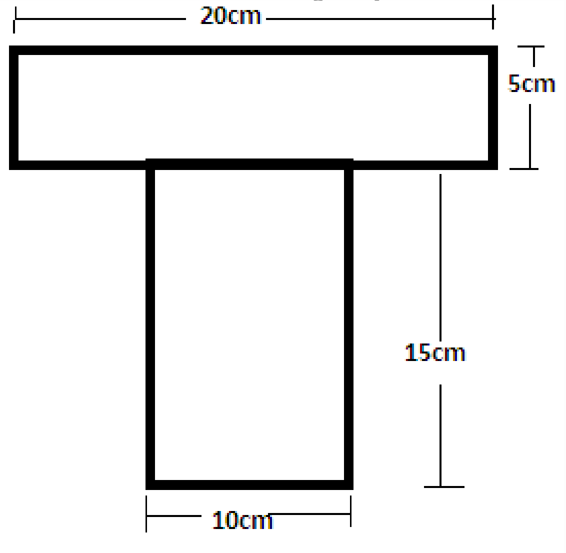
c) (10,5)

d) (5,10)

View Answer

Answer: c
Explanation: The centre of gravity of this rectangular area will be half of 10cm from x-axis and half of 20cm from y-axis. therefore the center of gravity will be at (10,5).

4. Where will be the centre of gravity of the T section shown in the figure?



a) 8

b) 8.5

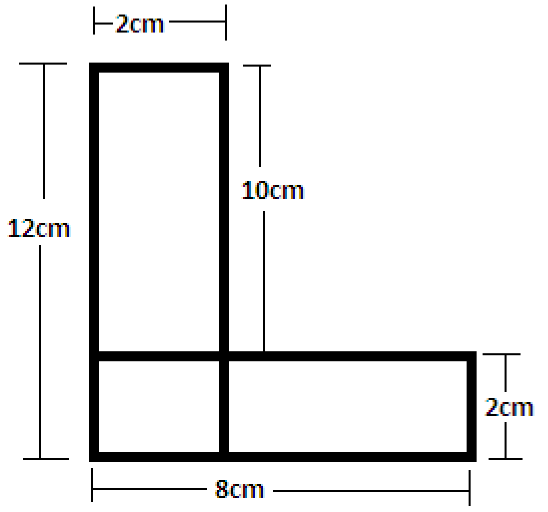
c) 10.5

d) 11.5

View Answer

Answer: d
Explanation: The center of gravity is given by, $y = (a_1y_1 + a_2y_2) / (a_1 + a_2) = (100\times17.5 + 150\times7.5) / (100+150) = 11.5$cm.

5. Where will be the center of gravity of the L-section shown in figure?



a) (4.33, 2.33)

b) (4, 6)

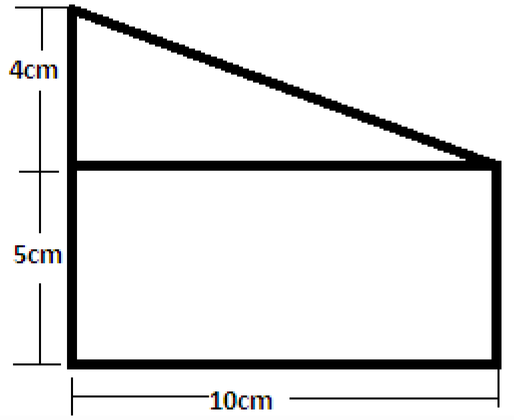
c) (2.33, 4.33)

d) (1, 5)

View Answer

Answer: c
Explanation: The center of gravity is given by, $y = (a_1y_1 + a_2y_2) / (a_1 + a_2) = (20\times7 + 16\times1) / (20+16) = 4.33$cm. This will on for the y-axis.
For the x-axis, The center of gravity is given by, $x = (a_1x_1 + a_2x_2) / (a_1 + a_2) = (20\times1 + 16\times4) / (20+16) = 2.33$cm.
So the center of gravity will be at (2.33, 4.33).

6. Where will be the center of gravity of the figure shown?



a) (3.45,4.52)

b) (3.59,4.52)

c) (3.66,5.17)

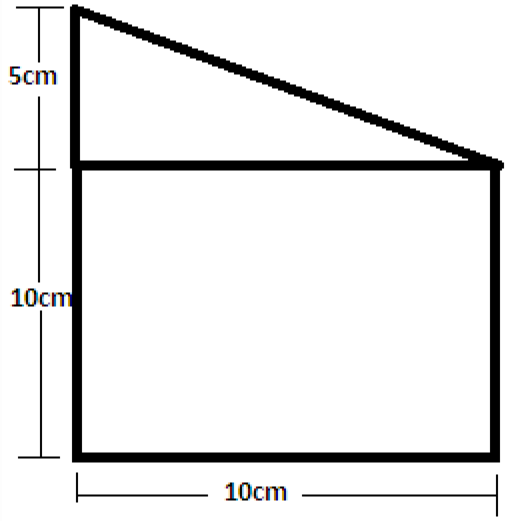
d) (4.01,5.15)

View Answer

Answer: b
Explanation: Area of triangle = 20, area of rectangle = 50
The center of gravity is given by, $y = (a_1y_1 + a_2y_2) / (a_1 + a_2) = (20\times10/3 + 50\times5) / (20+50) = 4.52$cm.

This will on for the y-axis.
For the x-axis, The center of gravity is given by, $x = (a_1x_1 + a_2x_2) / (a_1 + a_2) = (20×6.33 + 50×2.5) / (20+50) = 3.59$cm.
So the center of gravity will be at (2.33, 4.33).

7. Where will be the center of gravity of the shown figure?



a) (4.66,6.332)

b) (4.34,3.24)

c) (4.25,6.45)

d) (4.87,6.41)

View Answer

Answer: a
Explanation: Area of triangle = 25, area of rectangle = 100
The center of gravity is given by, $y = (a_1y_1 + a_2y_2) / (a_1 + a_2) = (25×10/3 + 100×5) / (25+100) = 4.66$cm.
This will on for the y-axis.
For the x-axis, The center of gravity is given by, $x = (a_1x_1 + a_2x_2) / (a_1 + a_2) = (25×11.66 + 100×5) / (25+100) = 6.332$cm.
So the center of gravity will be at (2.33, 4.33).

8. Where will be the center of gravity of an I section will be if the dimension of web is 2x20cm and that of flange is 2x15cm If the y-axis will pass through the center of the section?

a) 8.5cm

b) 9.5cm

c) 10.5cm

d) 11.5cm

View Answer

Answer: b
Explanation: The center of gravity is given by, $y = (a_1y_1 + a_2y_2 + a_3y_3) / (a_1 + a_2 + a_3) = (40×18 + 30×9.5 +40×1 / (40 +30+40) = 9.5$cm.

9. Where will be the center of gravity of an T section will be if the dimension of web is 2x20cm and that of flange is 2x15cm If the y-axis will pass through the center of the section?

a) 10.5cm

b) 11.45cm

c) 12.35cm

d) 12.85cm

View Answer

Answer: b
Explanation: The center of gravity is given by, y = $(a_1y_1 + a_2y_2) / (a_1 + a_2)$ = (40×16 + 30×7.5)/ (30+40) = 12.35cm.

10. Where will be the center of gravity of the following section?

a) 7.33cm

b) 8.33cm

c) 9.33cm

d) 10.33

View Answer

Answer: b
Explanation: Area of triangle = 50, area of rectangle = 50
The center of gravity is given by, y = $(a_1y_1 + a_2y_2) / (a_1 + a_2)$ = (50×11.66 + 50×5)/(50+50) = 8.33cm.
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11. Where will be the centre of gravity of the following L-section?

a) (18.31,30.81)

b) (19.45, 29.87)

c) (20,30)

d) (19.62,29.62)

View Answer

Answer: a
Explanation: The center of gravity is given by, y = $(a_1y_1 + a_2y_2) / (a_1 + a_2)$ = (600×50 + 414×3) / (600+414) = 18.31cm.
This will on for the y-axis.
For the x-axis, The center of gravity is given by, x = $(a_1x_1 + a_2x_2) / (a_1 + a_2)$ = (600×3 + 414×40.5) / (600+414) = 30.81cm.
So the center of gravity will be at (2.33, 4.33).

12. Where will be the center of gravity of an I section will be if the dimension of upper web is 2x8cm, lower web is 2×16 and that of flange is 2x12cm If the y-axis will pass through the center of the section?

a) 7.611cm

b) 7.44cm

c) 6.53cm

d) 6.44cm

View Answer

Answer: d
Explanation: Area of upper web a1 = 16cm, area of flange a2 = 24, area of lower web a3 = 32.
The center of gravity is given by, y = $(a_1y_1 + a_2y_2 + a_3y_3) / (a_1 + a_2 + a_3)$ = (16×15 + 24×8 +32×1 / (16 +24+32)) = 6.44cm.

Moment of Inertia

1. The axis about which moment of area is taken is known as ____________

a) Axis of area

b) Axis of moment

c) Axis of reference

d) Axis of rotation

View Answer

Answer: c
Explanation: The axis of reference is the axis about which moment of area is taken. Most of the times it is either the standard x or y axis or the centeroidal axis.

2. Point, where the total volume of the body is assumed to be concentrated is ____________

a) Center of area

b) Centroid of volume

c) Centroid of mass

d) All of the mentioned

View Answer

Answer: b
Explanation: The centroid of the volume is the point where total volume is assumed to be concentrated. It is the geometric centre of a body. If the density is uniform throughout the body, then the center of mass and center of gravity correspond to the centroid of volume. The definition of the centroid of volume is written in terms of ratios of integrals over the volume of the body.

3. What is MOI?

a) ml^2

b) mal

c) ar^2

d) None of the mentioned

View Answer

Answer: c
Explanation: The formula of the moment of inertia is, MOI = ar^2 where
M = mass, a = area, l = length, r = distance.

4. What is the formula of radius of gyration?

a) $k^2 = I/A$

b) $k^2 = I^2/A$

c) $k^2 = I^2/A^2$

d) $k^2 = (I/A)^{1/2}$

View Answer

Answer: a
Explanation: The radius of gyration of a body about an axis is a distance such that its square multiplied by the area gives moment of inertia of the area about the given axis. The formula of radius of gyration is given as $k^2 = I/A$.

5. What is the formula of theorem of perpendicular axis?

a) $I_{zz} = I_{xx} – I_{yy}$

b) $I_{zz} = I_{xx} + Ah^2$

c) $I_{zz} – I_{xx} = I_{yy}$

d) None of the mentioned

View Answer

Answer: c
Explanation: Theorem of perpendicular axis stares that if I_{XX} and I_{YY} be the moment of inertia of a plane section about two mutually perpendicular axis X-X and Y-Y in the plane of the section then the moment of inertia of the section I_{ZZ} about the axis Z-Z, perpendicular to the plane and passing through the intersection of X-X and Y-Y is given by the formula
$I_{zz} – I_{xx} = I_{yy}$.

6. What is the formula of theorem of parallel axis?

a) $I_{AD} = I_G + Ah$

b) $I_{AB} = Ah^2 + IG$

c) $I_{AB} = I_G – Ah^2$

d) $I_{AB} = I_G + I_{xx}$

View Answer

Answer: b
Explanation: The theorem of parallel axis states that if the moment of inertia of a plane area about an axis in the plane of area theough the C.G. of the plane area be represented by IG, then the moment of the inertia of the given plane area about a parallel axis AB in the plane of area at a distance h from the C.G. is given by the formula
$I_{AB} = Ah^2 + I_G$.

7. What is the unit of radius of gyration?

a) m^4

b) m

c) N

d) m^2

View Answer

Answer: b
Explanation: The radius of gyration = $(length^4/length^2)1/2$ = length
So its unit will be m.
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8. What will be the the radius of gyration of a circular plate of diameter 10cm?

a) 1.5cm

b) 2.0cm

c) 2.5cm

d) 3cm

View Answer

Answer: c
Explanation: The moment of inertia of a circle, $I = \pi D^4/64 = 491.07\ cm^4$
The area of circle = 78.57 cm,
Radius of gyration = $(I/A)^{1/2}$ = 2.5 cm.
Moment of Inertia of Section

1. What is the moment of inertia of a circular section?

a) $\pi D^4/64$

b) $\pi D^3/32$

c) $\pi D^3/64$

d) $\pi D^4/32$

View Answer

Answer: a
Explanation: The moment of inertia of a circular section is $\pi D^4/64$.

2. What is the moment of inertia of a rectangular section about an horizontal axis through C.G?

a) $bd^3/6$

b) $bd^2/12$

c) $b^2d^2/12$

d) $bd^3/12$

View Answer

Answer: d
Explanation: The moment of inertia of a rectangular section about an horizontal axis through C.G is $bd^3/12$.

3. What is the moment of inertia of a rectangular section about an horizontal axis passing through base?

a) $bd^3/12$

b) $bd^3/6$

c) $bd^3/3$

d) $bd^2/3$

View Answer

Answer: c
Explanation: The moment of inertia of a rectangular section about an horizontal axis passing through base is $bd^3/3$.

4. What is the moment of inertia of a triangular section about the base?

a) $bh^2/12$

b) $bh^3/12$

c) $bh^3/6$

d) $bh^2/6$

View Answer

Answer: b
Explanation: The moment of inertia of a triangular section about the base is $bh^3/12$.

5. What is the moment of inertia of a triangular section about an axis passing through C.G. and parallel to the base?

a) $bh^3/12$

b) $bh^3/24$

c) $bh^3/36$

d) $bh^3/6$

View Answer

Answer: c
Explanation: The moment of inertia of a triangular section about an axis passing through C.G. and parallel to the base is $bh^3/36$.

6. What will be the moment of inertia of a circle in cm4 of diameter is 10cm?

a) a340

b) 410

c) 460

d) 490

View Answer

Answer: d
Explanation: The moment of inertia of a circle is = $\pi D^4/64$
= 491.07 cm^4.

7. What will be the moment of inertia of the given rectangle about an horizontal axis passing through the base?

a) 1500 mm^4

b) 1650 mm^4

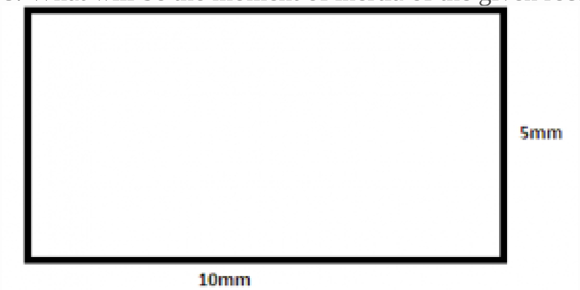
c) 1666 mm^4

d) 1782 mm^4

View Answer

Answer: c
Explanation: The moment of inertia of a rectangular section about an horizontal axis passing through base = $bd^3/3$
= 5x10x10x10/3
= 1666.66 mm^4.

8. What will be the moment of inertia of the given rectangular section about an horizontal axis through C.G.?



a) 350 mm^4

b) 379mm^4

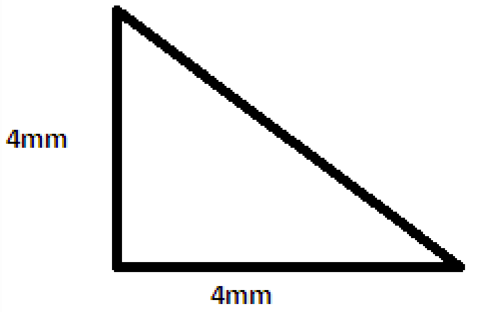
c) 416mm^4

d) 500mm^4

View Answer

Answer: c
Explanation: The moment of inertia of a rectangular section about an horizontal axis through C.G = $bd^3/12$
= 5x10x10x10/12
= 416.67 mm^4.

9. What will be the moment of inertia of the given triangle about the base?



a) 20.33 mm^4

b) 21.33 mm^4

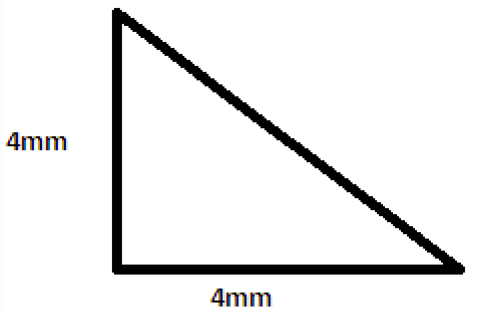
c) 24.33 mm^4

d) 22.33 mm^4

View Answer

Answer: b
Explanation: The moment of inertia of a triangular section about the base = $bh^3/12$.
= 4x4x4x4/12
= 21.33 mm^4.

10. What will be the moment of inertia of the given triangle about an axis passing through C.G and parallel to base?



a) 6.1 mm^4

b) 7.1 mm^4

c) 8.1 mm^4

d) 7.56 mm^4

View Answer

Answer: b
Explanation: The moment of inertia of a triangular section about an axis passing through C.G. and parallel to the base = $bh^3/36$.
= 4x4x4x4/36
= 7.11 mm^4.
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11. What will be the difference between MOI of two triangle sections is in 1st, MOI is taken about its base and in 2nd MOI is taken about its centroid?

a) $bh^3/12$

b) $bh^3/18$

c) $bh^3/36$

d) $bh^3/24$

View Answer

Answer: b
Explanation: The moment of inertia of a triangular section about the base is $bh^3/12$
The moment of inertia of a triangular section about an axis passing through C.G. is $bh^3/36$
So the difference = $bh^3/12 – bh^3/36 = bh^3/18$.
Mass Moment of Inertia

1. What is the product of the mass and the square of the distance of the center of gravity of the mass from an axis?

a) Moment of inertia

b) Mass moment of inertia

c) Center of gravity

d) Product of inertia

View Answer

Answer: b
Explanation: The product of the mass and the square of the distance of the center of gravity of the mass from an axis is known as the mass moment of inertia about that axis.

2. What is the unit of mass moment of inertia?

a) m^4

b) m^6

c) N

d) m^2

View Answer

Answer: b
Explanation: The mass moment of inertia is the product of moment of inertia and area. So $L^4 \times L^2 = L^6$. so its unit will be m^6.

3. What is mass moment of inertia of circular plate?

a) $Md^2/3$

b) $Md^2/12$

c) $Mr^2/4$

d) $Mr^2/3$

View Answer

Answer: c
Explanation: The mass moment of inertia of circular plate is $Mr^2/4$.

4. What is the mass MOI of a rectangular plate about x-axis passing through the C.G of the plate if the y-axis is parallel to d and perpendicular to b?

a) $Mb^2/12$

b) $Md^2/12$

c) $Md^2/6$

d) $Mb^2/6$

View Answer

Answer: b
Explanation: As the mass MOI is to be find along the x-axis, it would be $Md^2/12$.

5. What is the mass MOI of right circular cone of radius R and height H about its axis?

a) $4MR^2/10$

b) $MR^2/10$

c) $3MR^2/10$

d) $MR^2/12$

View Answer

Answer: c
Explanation: The mass MOI of right circular cone of radius R and height H about its axis is $3MR^2/10$.

6. What is the mass MOI of a hollow circular cylinder if R is the outer diameter and r is the inner diameter?

a) M(R + r)/4

b) M(R – r)/4

c) M(R+ r)/2

d) M(R – r)/2

View Answer

Answer: a
Explanation: The mass MOI of a hollow circular cylinder is M(R + r)/4 where R is the outer diameter and r is the inner diameter.

7. What is the mass MOI of a rectangular plate about y-axis passing through the C.G of the plate if the y-axis is parallel to d and perpendicular to b?

a) $Mb^2/12$

b) $Md^2/12$

c) $Md^2/6$

d) $Mb^2/6$

View Answer

Answer: a
Explanation: As the mass MOI is to be find along the y-axis, it would be $Mb^2/12$.

8. The product of inertia at the principal axes is ______________

a) Minimum

b) Unit

c) Zero

d) Maximum

View Answer

Answer: c
Explanation: The moment of inertia about x-axis and about y-axis, on the axis they are zero. So the product of inertia will be zero in the principal axis.

9. What is the unit of product of inertia?

a) mm^4

b) mm^2

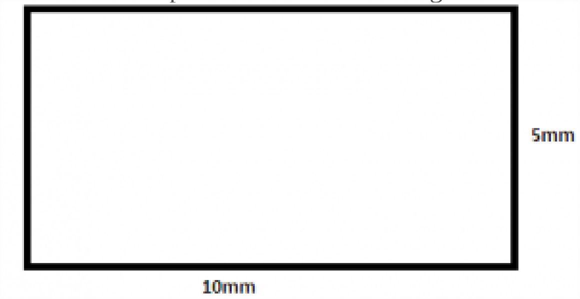
c) mm

d) mm^3

View Answer

Answer: a
Explanation: The unit of product of inertia is same as that of moment of inertia I.e. mm^4.

10. What is the product of inertia of the given following section?



a) $50mm^4$

b) $625mm^4$

c) $125mm^4$

d) $250mm^4$

View Answer

Answer: b
Explanation: The product of inertia = area x points of C.G
= (10×5) x 5 x 2.5 = $625mm^4$.
advertisement

11. What is the product of inertia of a circle of diameter 10mm?

a) $1862mm^4$

b) $1945mm^4$

c) $1963mm^4$

d) $2014mm^4$

View Answer

Answer: c
Explanation: The product of inertia = area x C.G
= πx 10×10 / 4 x 5×5 = $1963mm^2$.
Types of Beams and Loads

1. _______ is a horizontal structural member subjected to transverse loads perpendicular to its axis.

a) Strut

b) Column

c) Beam

d) Truss

View Answer

Answer: c
Explanation: A beam is a horizontal structural member subjected to a transverse load perpendicular to its own

axis. Beams are used to support weights of roof slabs, walls and staircases. The type of beam usually depends upon the span, type of load elasticity and type of structure.

2. Example for cantilever beam is _______

a) Portico slabs

b) Roof slab

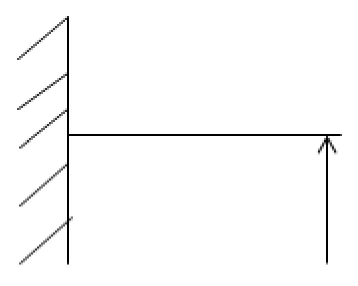
c) Bridges

d) Railway sleepers

View Answer

Answer: a
Explanation: A beam which is fixed at one end and is free at other end, it is called cantilever beam. The examples for it are portico slabs and sunshades.

3. The diagram depicts ________ kind of beam.



a) Cantilever

b) Continuous

c) Over hanging

d) Propped cantilever

View Answer

Answer: d
Explanation: A beam which is fixed at one end and free at other end is called cantilever beam. In this case, some support other than the existing ones may be provided in order to avoid excessive deflection or to reduce the amount of bending moment, the additional support is known as a prop. The beam is known as a propped cantilever beam.

4. Fixed beam is also known as ___________

a) Encastered beam

b) Built on beam

c) Rigid beam

d) Tye beam

View Answer

Answer: a
Explanation: A beam which is fixed at both supports is called fixed beam or encastered beam. All framed structures are examples of fixed beams.

5. U.D.L stands for?

a) Uniformly diluted length

b) Uniformly developed loads

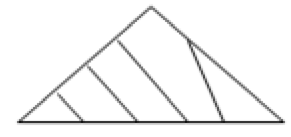
c) Uniaxial distributed load

d) Uniformly distributed loads

View Answer

Answer: d
Explanation: These loads are uniformly spread over a portion or whole area. They are generally represented as rate of load that is Kilo Newton per meter length (KN/m).

6. Given below diagram is _______ load.



a) Uniformly distributed load

b) Uniformly varying load

c) Uniformly decess load

d) Point load

View Answer

Answer: b
Explanation: A load which varies uniformly on each unit length is known as uniformly varying load. Sometimes the load is zero at one end and increases uniformly to the other forms of uniformly varying loads.

7. Moving train is an example of _____ load.

a) Point load

b) Cantered load

c) Rolling load

d) Uniformly varying load

View Answer

Answer: c
Explanation: As train’s wheels (rolling stock) move in rolling way. The upcoming load will be considered as rolling load.

8. Continuous beams are __________

a) Statically determinate beams

b) Statically indeterminate beams

c) Statically gravity beams

d) Framed beams

View Answer

Answer: b
Explanation: Fixed beams and continuous beams are statically indeterminate beams which cannot be analyzed only by using static equations.

9. A beam which extends beyond it supports can be termed as ___________

a) Over hang beam

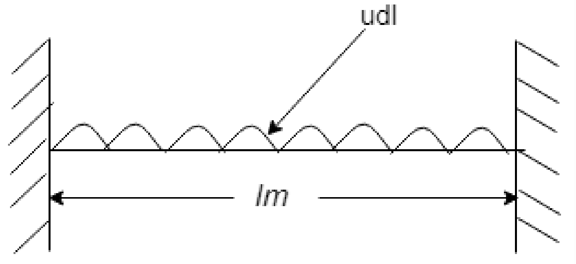
b) Over span beam

c) Isolated beams

d) Tee beams

View Answer

Answer: a
Explanation: A Beam extended beyond its support. And the position of extension is called as over hung portion.



10. Units of U.D.L?

a) KN/m

b) KN-m

c) KN-m×m

d) KN

View Answer

Answer: a
Explanation: As these loads distribute over span the units for this kind of loads will be load per meter length i.e KN/m. It is denoted by “w”.
Introduction to Shear Force and Bending Moment

1. Shear force is unbalanced _____ to the left or right of the section.

a) Horizontal force

b) Vertical force

c) Inclined force

d) Conditional force

View Answer

Answer: b
Explanation: The shear force at the cross section of a beam may also be defined as the unbalanced vertical force to the left or right of the section. It is also the algebraic sum of all the forces I get to the left to the right of the section.

2. SI units of shear force is _______________

a) kN/m

b) kN-m

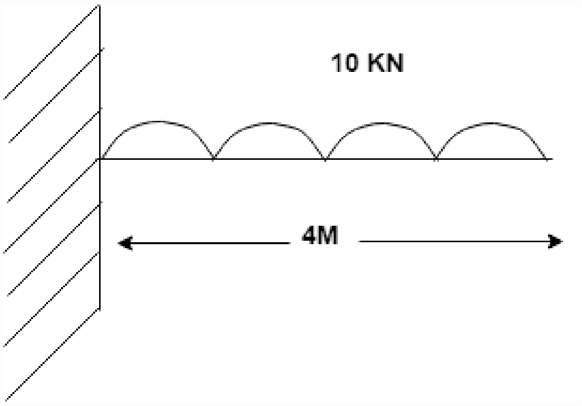
c) kN

d) m/N

View Answer

Answer: c
Explanation: As shear force at any section is equal to the algebraic sum of the forces, the units of the shear force are also in kilo newtons and it is denoted by kN.

3. Determine the moment at fixed end.



a) 40 kNm

b) 50 kNm

c) 60 kNm

d) 80 kNm

View Answer

Answer: a
Explanation: Let the fixed end be "A"
Reaction at A = 10×4 = 40 kN
Moment at A = (10×4)×4/2
= 80 kNm.

4. Shear force is diagram is _______ representation of shear force plotted as ordinate.

a) Scalar

b) Aerial

c) Graphical

d) Statically

View Answer

5. Hogging is________

a) Negative bending moment

b) Positive shear force

c) Positive bending moment

d) Negative shear force

View Answer

Answer: a
Explanation: The bending moment at a section is considered to be negative when it causes convexity upwards or concavity at bottom, such bending moment is called hogging bending moment or negative bending moment.

6. At the point of contraflexure, the value of bending moment is ____________

a) Zero

b) Maximum

c) Can't be determined

d) Minimum

View Answer

Answer: a
Explanation: A point at which bending moment changes its sign from positive to negative and vice versa. Such point is termed as point of contraflexure. At this point, the value of bending moment is zero (0).

7. _________ positive/negative bending moments occur where shear force changes its sign.

a) Minimum

b) Zero

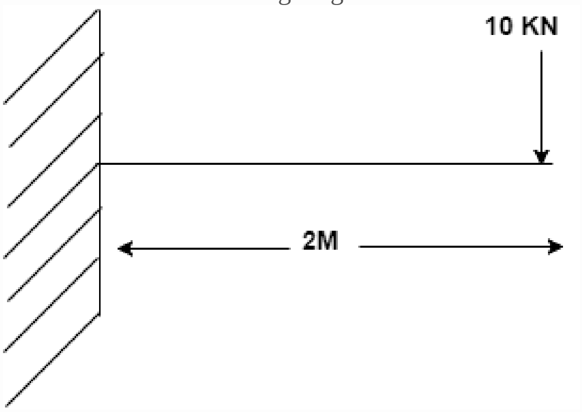
c) Maximum

d) Remains same

View Answer

Answer: c
Explanation: If shear force and bending moment values obtained are thus plotted as a diagram, the SF & BM relationship always behaves vice versa.

8. Shear force of following diagram



a) Rectangle

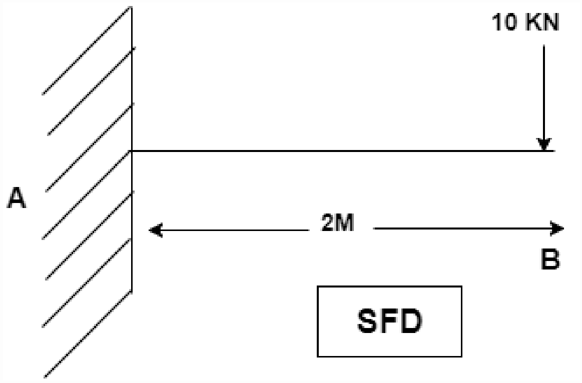
b) Square

c) Circle

d) Trapezoidal

View Answer

Answer: a
Explanation: SF @ AB is 10 kN
FA = 10 kN
FB = 10 kN.



9. SI units of Bending moment is ___________

a) kN

b) kN^2

c) kNm

d) km

View Answer

Answer: c
Explanation: Moment is a product of force and perpendicular distance and the bending moment is the algebraic sum of moments taken away from the left or the right of the section hence the SI units of bending moment is same as the moment i.e kNm.

10. What is the other name for a positive bending moment?

a) Hogging

b) Sagging

c) Inflation

d) Contraflexure

View Answer

Answer: b
Explanation: The bending moment at a section is considered to be positive when it causes convexity downwards such bending moment is called sagging bending moment positive bending moment.
Types of Supports

1. A simple support offers only_______ reaction normal to the axis of the beam.

a) Horizontal

b) Vertical

c) Inclined

d) Moment

View Answer

Answer: a
Explanation: In a simple support there will not be any resistance to horizontal loads, moment or rotation. In fact, it only offers a vertical reaction normal to the axis of the beam.

2. To avoid _____ stresses in beams, one end of the beam is placed on the rollers.

a) Compressive

b) Pyro

c) Temperature

d) Tensile

View Answer

Answer: c
Explanation: Roller support reaction is normal to the axis of the beam. In case the beam subjected to trust or to avoid temperature stresses in the beam, one end of the beam is placed on roller because it facilitate free horizontal movement of end. It is similar to simple support.

3. ________ support develops support moment.

a) Hinged

b) Simple

c) Fixed

d) Joint

View Answer

Answer: c
Explanation: A fixed support offers resistance against horizontal and vertical movement and against the rotation of the member and that in turn developers support moment.

4. Hinge support is called as __________

a) Socket joint

b) Swivel joint

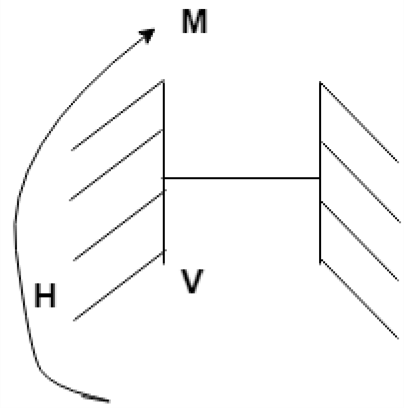
c) Ball joint

d) Pin joint

View Answer

Answer: d
Explanation: Hinge support is one, in which the position is fixed but not the direction. In their words hinged support offers resistance against vertical and horizontal moments.it is fixed in such a way that it resembles like a pin joint.

5. Name the support from following figure.



a) Hinge support

b) Fixed support

c) Free support

d) Roller support

View Answer

Answer: b
Explanation: In the above figure we can observe that the beam is supported at both the ends so the beam is fixed at both ends. Hence the support is a fixed support.

6. For a simply supported beam, the moment at the support is always __________

a) Maximum

b) Zero

c) Minimum

d) Cannot be determined

View Answer

Answer: b
Explanation: As the moment is a product of force and perpendicular distance, the flexural moment at the support is zero because there is no distance at the support.

7. “Hinged support offers resistance against rotation”.

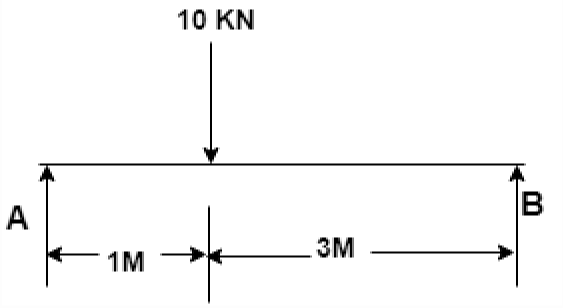
a) True

b) False

View Answer

Answer: b
Explanation: A hinged support offers resistance against horizontal and vertical movement but not against rotation. It support offers a vertical and horizontal reaction only.

8. Find the reaction at simple support A?



a) 6.5 kN

b) 9 kN

c) 10 kN

d) 7.5 kN

View Answer

Answer: d
Explanation: Total load = 10 kN
Taking moment at A = 0
4 × R @ B – 10 = 0
R @ B = 2.5 kN
Reaction at A = 10 – 2.5 = 7.5kN.

9. Roller support is same as ______

a) Hinged support

b) Fixed support

c) Simply support

d) Roller support

View Answer

Answer: c
Explanation: The support reaction is normal to the axis of the beam. It facilitates the vertical support. It helps the beam to overcome the temperature stresses effectively. It is similar to simple support.

10. Hinged supports offers vertical and _________ reaction.

a) Horizontal

b) Moment

c) Rotation

d) Couple

View Answer

Answer: a
Explanation: A hinged support offers a vertical and horizontal reaction. The pin jointed support offers resistance against horizontal and vertical movements but not against rotation movement.
Maximum Shear Force

1. Which of these is the correct way of sign convention for shear force?

a) R U P

b) L U P

c) R U N

d) L D P

View Answer

Answer: c
Explanation: According to the theoretical approach, there are many sign conventions to follow but the standard one is "right upwards negative" the sign convention is thoroughly followed unanimously.

2. At hinge, the moments will be _________

a) Maximum

b) Minimum

c) Uniform

d) Zero

View Answer

Answer: d
Explanation: At the support of a member, there is no distance prevailing to take the upcoming load. As we know the moment is a product of force and perpendicular distance, but at hinge (end support) the distance is zero. Hence the moment developed is zero.

3. What is variation in SFD, if the type of loading in the simply supported beam is U.D.L is ____

a) Rectangle

b) Linear

c) Trapezoidal

d) Parabolic

View Answer

Answer: b
Explanation: The shear force is defined as the algebraic sum of all the forces taken from any one of the section. If you figure out the SFD for a simply supported beam carrying U.D.L throughout its entire length, in the SFD we can observe that shear force is same at supports. In the centre, the shear force is zero. Hence the diagram varies linearly.

4. The rate of change of shear force is equal to _____

a) Direction of load

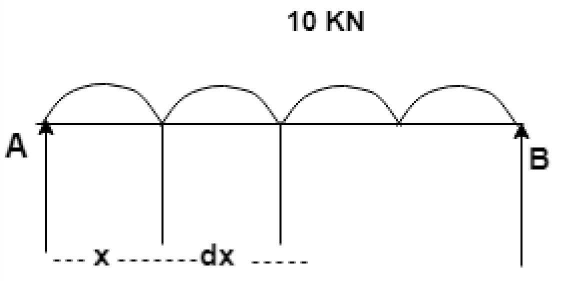
b) Change in BMD

c) Intensity of loading

d) Maximum bending

View Answer

Answer: c
Explanation: Consider a simply supported beam subjected to udl for the entire span considered a free body diagram of small portion of elemental length dx.



Let the shear force at left of the section is = F
Let the increase in shear force in length of the dx = dF
Let the Indian city of load on this part of the beam = w
Total downward load in this elemental length = wdx
€V = 0
dF = -wdx
dF/dx = -w
This rate of change of shear force at any section is equal to the intensity of loading at that section.

5. The shear force in a beam subjected to pure positive bending is ______

a) Positive

b) Negative

c) Zero

d) Cannot determine

View Answer

Answer: c
Explanation: In the determination of shear force and bending moment diagrams it is clear that shear force changes its sign when the bending moment in a beam is maximum and the shear force in a beam subjected to pure positive bending will be zero as the neutralizing effect comes under.

6. In SFD, vertical lines are for _______

a) Point loads

b) UDL

c) UVL

d) LDP

View Answer

Answer: a
Explanation: Shear Force diagram started from left side of the m as per the load. For point loads draw vertical lines and under UDL draw slope lines.

7. A cantilever beam loaded with udl throughout, the maximum shear force occurs at_____

a) Free end

b) Fixed end

c) At centre

d) At point of contraflexure

View Answer

Answer: b
Explanation: In a case of a cantilever beam subjected to udl, at the free end there will be zero shear force because, we need to convert udl to load by multiplying with distance. Hence at the fixed end the shear force is w×l i.e (maximum).

8. A simply supported beam of span 1 m carries a point load “w” in centre determine the shear force in the half left of the beam.

a) W/3

b) W/4

c) W/2

d) W

View Answer

Answer: c
Explanation: Let the two ends of the beam be A and B, the given load on a beam is symmetrical hence RA = RB= W/2. SFD at any section in the left of the beam is equal to the W/2. SFDat any section in the right half of the beam is equal to -W/2.

9. Point of inflection is known as ______

a) Point of regurrence

b) Point of contraflexure

c) Point of rigid factor

d) Point of flexural moment

View Answer

Answer: b
Explanation: Point of contraflexure in a beam is a point at which bending moment changes its sign from positive to negative and vice versa. Point of inflection is popularly known as point of contraflexure. At the point of contraflexure, the value of bending moment is zero.

10. When SF is zero, the bending moment is ______

a) Zero

b) Maximum

c) Very difficult to say

d) Minimum

View Answer

Answer: a
Explanation: When is shear force changes its sign, the bending moment in a beam will be either maximum positive or maximum negative. This is because of the sign convention adopted.
Maximum Bending Moment

1. A cantilever beam subjected to point load at its free end, the maximum bending moment develops at the _________ of the beam.

a) Free end

b) Fixed end

c) Centre

d) Point of inflection

View Answer

Answer: b
Explanation: As the moment is the product of perpendicular distance and force. In cantilever beam, at its free end the moment will be zero as there is no distance, but at the fixed end the moment is maximum that is W×l.

2. Bending moment in a beam is maximum when the _________

a) Shear force is minimum

b) Shear force is maximum

c) Shear force is zero

d) Shear force is constant

View Answer

Answer: c
Explanation: The maximum bending moment occurs in a beam, when the shear force at that section is zero or changes the sign because at point of contra flexure the bending moment is zero.

3. Positive bending moment is known as _______

a) Hogging

b) Sagging

c) Ragging

d) Inflection

View Answer

Answer: a
Explanation: The positive bending moment in a section is considered because it causes convexity downwards. Such bending moment is called a sagging bending moment or positive bending moment.

4. A simply supported beam of span "x" meters carries a udl of "w" per unit length over the entire span, the maximum bending moment occurs at _____

a) At point of contra flexure

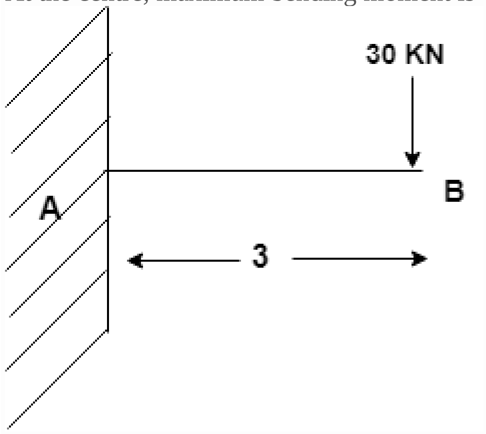
b) Centre

c) End supports

d) Anywhere on the beam

View Answer

Answer: b
Explanation: As we know that BM occurs at center. Because at supports the moment is obviously zero.
At the centre, maximum bending moment is $wl^2/8$.



5. The maximum BM is ______

a) 40 kNm

b) 50 kNm

c) 90 kNm

d) 75 kNm

View Answer

Answer: c
Explanation: Above diagram depicts cantilever beam subjected to point load at the free end. The maximum bending moment at A is W × I
= 30 × 3
= 90 kNm.

6. Bending moment can be denoted by _____

a) K

b) M

c) N

d) F

View Answer

Answer: b
Explanation: Bending moment is the product of force and perpendicular distance. Units are kNm
It is denoted by "M". Whereas SF is denoted by "F".

7. Number of points of contra flexure for a double over hanging beam.

a) 3

b) 2

c) 4

d) Infinite

View Answer

Answer: b
Explanation: Point of contraflexure in a beam is a point at which bending moment changes its sign from positive to negative and vice versa. In the case of overhanging beam, there will be two points of contraflexure.

8. Maximum bending moment in a cantilever beam subjected to udl (w)over the entire span (l).

a) wl

b) wl^3

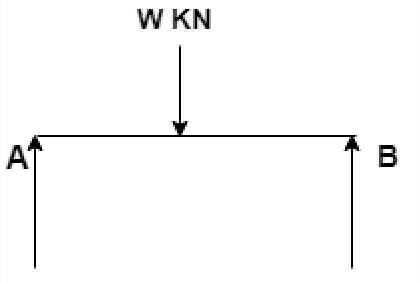
c) wl^2

d) w

View Answer

Answer: c
Explanation: In a cantilever beam the maximum bending moment occurs at the fixed end. Moment at the free end is 0 and maximum at the fixed end. Maximum shear force is w×l.

9. Determine the maximum bending moment for the below figure.



a) wl/2

b) wl/3

c) wl/4

d) wl

View Answer

Answer: c
Explanation: First of all, let’s assume the length between end supports be ”l” the maximum bending moment in a simply supported beam with point load at its centre is wl/4. We know that in simply supported beam the maximum bending moment occurs at the centre only.

10. What is the variation in the BM, if the simply supported beam carries a point load at the centre.

a) Triangular

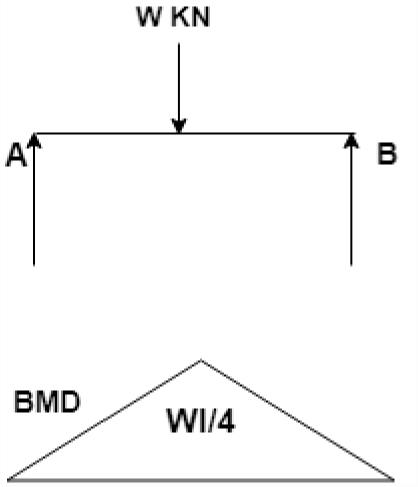
b) Rectangular

c) Trapezoidal

d) Other quadrilateral

View Answer

Answer: a
Explanation: For simply supported beam with point load at the centre, the maximum bending moment will be at the centre i.e. wl/4. The variation in bending moment is triangular.



Shear Force and Bending Moment Diagram

1. What is the bending moment at end supports of a simply supported beam?

a) Maximum

b) Minimum

c) Zero

d) Uniform

View Answer

Answer: c
Explanation: At the end supports, the moment (couple) developed is zero, because there is no distance to take the perpendicular acting load. As the distance is zero, the moment is obviously zero.

2. What is the maximum shear force, when a cantilever beam is loaded with udl throughout?

a) w×l

b) w

c) w/l

d) w+l

View Answer

Answer: a
Explanation: In cantilever beams, the maximum shear force occurs at the fixed end. In the free end, there is zero shear force. As we need to convert the udl in to load, we multiply the length of the cantilever beam with udl acting upon. For maximum shear force to obtain we ought to multiply load and distance and it surely occurs at the fixed end (w×l).

3. Sagging, the bending moment occurs at the ______ of the beam.

a) At supports

b) Mid span

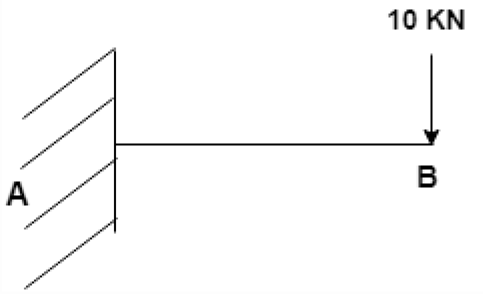
c) Point of contraflexure

d) Point of emergence

View Answer

Answer: b
Explanation: The positive bending moment is considered when it causes convexity downward or concavity at top. This is sagging. In simply supported beams, it occurs at mid span because the bending moment at the supports obviously will be zero hence the positive bending moment occurs in the mid span.

4. What will be the variation in BMD for the diagram? [Assume l = 2m].



a) Rectangular

b) Trapezoidal

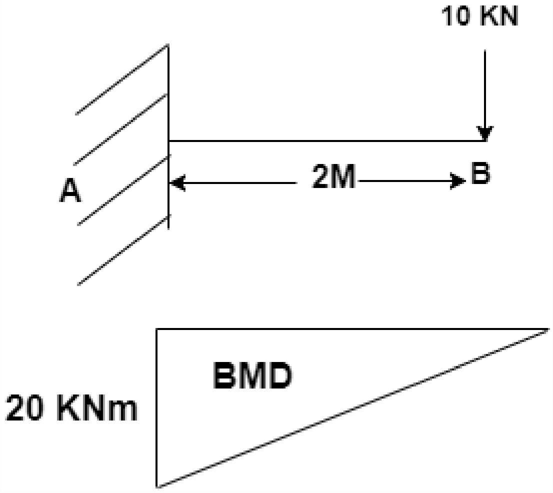
c) Triangular

d) Square

View Answer

Answer: c
Explanation: At support B, the BM is zero. The beam undergoes maximum BM at fixed end.

By joining the base line, free end and maximum BM point. We obtain a right angled triangle.



5. What is the maximum bending moment for simply supported beam carrying a point load “W” kN at its centre?

a) W kNm

b) W/m kNm

c) W×l kNm

d) W×l/4 kNm

View Answer

Answer: d
Explanation: We know that in simply supported beams the maximum BM occurs at the central span.
Moment at A = Moment at B = 0
Moment at C = W/2 × l/2 = Wl/ 4 kNm (Sagging).

6. How do point loads and udl be represented in SFD?

a) Simple lines and curved lines

b) Curved lines and inclined lines

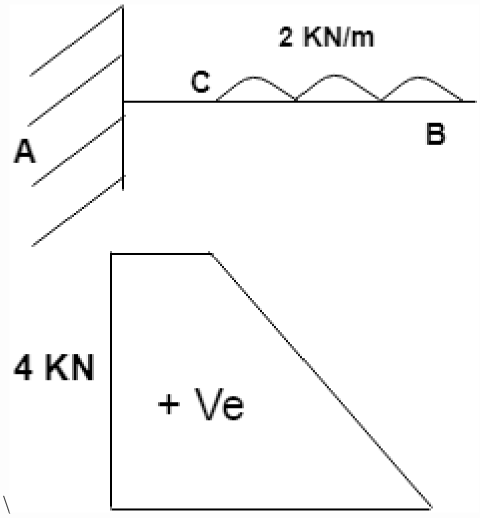
c) Simple lines and inclined lines

d) Cant represent any more

View Answer

Answer: c
Explanation: According to BIS, the standard symbols used for sketching SFD are

Point load = ————



Udl load = \

7. ________ curve is formed due to bending of over hanging beams.

a) Elastic

b) Plastic

c) Flexural

d) Axial

View Answer

Answer: a
Explanation: The line to which the longitudinal axis of a beam bends or deflects or deviates under given load is known as elastic curve on deflection curve. Elastic curve can also be known as elastic line or elastic axis.

8. The relation between slope and maximum bending moment is _________

a) Directly proportion

b) Inversely proportion

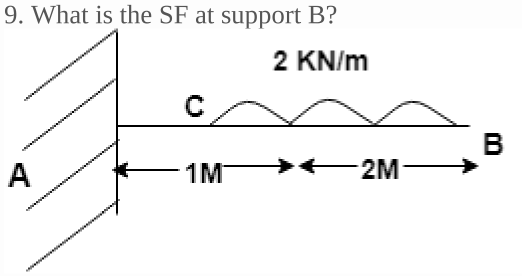
c) Relative proportion

d) Mutual incidence

View Answer

Answer: b
Explanation: The relationship between slope and maximum bending moment is inversely proportional because, For example in simply supported beams slope is maximum at supports and zero at midspan of a symmetrically loaded beam where as bending moment is zero at supports and maximum at mid span. Hence we conclude that slope and maximum bending moment are inversely proportional to each other in a case of the simply supported beam.

9. What is the SF at support B?



a) 5 kN

b) 3 kN

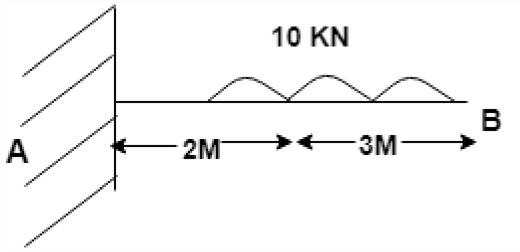
c) 2 kN

d) 0 kN

View Answer

Answer: d
Explanation: Total load = 2×2 = 4kN
Shear force at A = 4 kN (same between A and C)
Shear force at C = 4 kN
Shear force at B = 0 kN
Maximum SF at A = 4 kN.

10. Where do the maximum BM occurs for the below diagram.



a) -54 kNm

b) -92 kNm

c) -105 kNm

d) – 65 kNm

View Answer

Answer: c
Explanation: Moment at B = 0
Moment at C = – (10 × 3) × (3/2)
= – 45 kNm
Moment at A = – (10 × 3) × (1.5 + 2)
Maximum BM at A = – 105 kNm
= 105 Nm (hogging).
Bending Equation

1. In simple bending, _______ is constant.

a) Shear force

b) Loading

c) Deformation

d) Bending moment

View Answer

Answer: d
Explanation: If a beam is undergone with simple bending, the beam deforms under the action of bending moment. If this bending moment is constant and does not affect by any shear force, then the beam is in state of simple bending.

2. If a beam is subjected to pure bending, then the deformation of the beam is_____

a) Arc of circle

b) Triangular

c) Trapezoidal

d) Rectangular

View Answer

Answer: a
Explanation: The beam being subjected to pure bending, there will be only bending moment and no shear force it results in the formation of an arc of circle with some radius known as radius of curvature.

3. When a beam is subjected to simple bending, _____________ is the same in both tension and compression for the material.

a) Modulus of rigidity

b) Modulus of elasticity

c) Poisson's ratio

d) Modulus of section

View Answer

Answer: b
Explanation: It is one of the most important assumptions made in the theory of simple bending that is the modulus of elasticity that is Young's modulus [E] is same in both tension and compression for the material and the stress in a beam do not exceed the elastic limit.

4. E/R = M/I = f/y is a bending equation.

a) True

b) False

View Answer

Answer: a
Explanation: The above-mentioned equation is absolutely correct.
E/R = M/I = f/y is a bending equation. It is also known as flexure equation (or) equation for theory of simple bending.
Where,
E stands for Young's modulus or modulus of elasticity.
R stands for radius of curvature.
M stands for bending moment
I stand for moment of inertia
f stands for bending stress
y stands for neutral axis.

5. Maximum Shearing stress in a beam is at ______

a) Neutral axis

b) Extreme fibres

c) Mid span

d) Action of loading

View Answer

Answer: a
Explanation: Shearing stress is defined as the resistance offered by the internal stress to the shear force. Shearing stress in a beam is maximum at a neutral axis.

6. At the neutral axis, bending stress is ______

a) Minimum

b) Maximum

c) Zero

d) Constant

View Answer

Answer: c
Explanation: Neutral axis is defined as a line of intersection of neutral plane or neutral layer on a cross section at the neutral axis of that section. At the NA, bending stress or bending strain is zero. The first moment of area of a beam section about neutral axis is also zero. The layer of neutral axis neither contracts nor extends.

7. Curvature of the beam is ___________ to bending moment.

a) Equal

b) Directly proportion

c) Inversely proportion

d) Coincides

View Answer

Answer: b
Explanation: From the flexural equation, we have 1/R is called as the "curvature of the beam".
$1 / R = M / EI$
Hence the curvature of the beam is directly proportional to bending moment and inversely proportional to flexural rigidity (EI).

8. What are the units of flexural rigidity?

a) Nm^2

b) Nm

c) N/m

d) m/N^3

View Answer

Answer: a
Explanation: The product of young's modulus (E) of the material and moment of inertia (I) of the beam section about its neutral axis is called flexural rigidity.
Units for E are N/m^2
Units for I are m^4
Their product is Nm^2.

9. What are the units for section modulus?

a) m^2

b) m^4

c) m^3

d) m

View Answer

Answer: c
Explanation: The ratio of moment of inertia to the distance to the extreme fibre is called modulus of section or section modulus. It is generally denoted by the letter Z. Section modulus is expressed in m^3
$Z = I/y$
$= m^4/ m$
$= m^3$.

10. What are the units of axial stiffness?

a) m^3

b) m^2

c) N/ m

d) -m

View Answer

Answer: c
Explanation: Axial rigidity is a product of young's modulus (E) and the cross-sectional area (A) of that section. Axial rigidity per unit length is known as axial stiffness the si units of axial stiffness are Newton per metre (N/m).
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11. Calculate the modulus of section of rectangle beam of size 240 mm × 400 mm.

a) 5.4×10^6 mm^3

b) 6.2×10^6 mm^3

c) 5.5×10^6 mm^3

d) 6.4×10^6 mm^3

View Answer

Answer: d
Explanation: b = 240 mm & d = 400 mm
Moment of inertia (I) = $bd^3/12$; y = d/2
Section modulus (Z) = I/y = $bd^2/ 6$
= 1/6 × 240 × 400 ×400
= 6.4×10^6 mm^3.

12. What is the product of force and radius?

a) Twisting shear

b) Turning shear

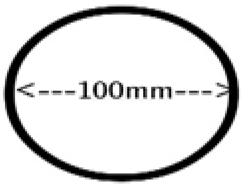
c) Turning moment

d) Tilting moment

View Answer

Answer: c
Explanation: Twisting moment will be equal to the product of the perpendicular force and existing radius. Denoted by letter T and SI units are Nm.

13. Determine section modulus for beam of 100mm diameter.



a) 785×10^3 mm^3

b) 456×10^3 mm^3

c) 87×10^3 mm^3

d) 98×10^3 mm^3

View Answer

Answer: d
Explanation: d = 300mm
For circular sections; I = $\pi / 64 \times d^4$

y= d/2
$Z = \pi/32 \times d^3$ (d = 100 mm)
$Z = 98.17 \times 10^3 mm^3$.
Pure Bending Stress

1. In simply supported beams, the ______ stress distribution is not uniform.

a) Bending

b) Shearing

c) Tensile

d) Compressive

View Answer

Answer: a
Explanation: In a simply supported beam, there is compressive stress above the neutral axis and tensile stress below it. It bends with concavity upwards. Hence the bending stress distribution is not uniform over the section.

2. The maximum __________ stresses occur at top most fibre of a simply supported beam.

a) Tensile

b) Compressive

c) Shear

d) Bending

View Answer

Answer: b
Explanation: As bending stress distribution is not uniform over the section in simply supported beams, the maximum compressive stress lies above the neutral axis. Obviously, top most fibre of beam. The maximum tensile stress occurs at bottom most fibre.

3. The stress is directly proportional to ________

a) E

b) u

c) y

d) R

View Answer

Answer: c
Explanation: By two equations; we have e = y/R & e = f/E
Equating both equations; we get e = f/E = y/R
Hence stress (f) is directly proportional to the distance from neutral axis(y).

4. At the extreme fibre, bending stress is_______

a) Minimum

b) Zero

c) Constant

d) Maximum

View Answer

Answer: d
Explanation: Bending stress is defined as the resistance offered by internal stress to bending. In beams, stresses occurs above or below the neutral axis i.e at the extreme fibres. Hence bending stress is maximum at the extreme fibres.

5. The curvature of a beam is equal to ______

a) EI/M

b) M/E

c) M/EI

d) E/MI

View Answer

Answer: c
Explanation: From the bending equation, E/R = M/I = f/y.
Where R is called "radius of curvature "
1/R is called "curvature of the beam ".
So, 1/R = M/EI.
So curvature of the beam is directly proportional to bending moment.

6. Skin stress is also called as _______

a) Shear stress

b) Bending stress

c) Lateral stress

d) Temperature stress

View Answer

Answer: b
Explanation: The bending moment leads to deform or deflect the beam and internal stress resists bending. The resistance offered by internal stress to bending is called bending stress or "fibre stress" or "skin stress" or "longitudinal stress".

7. __________ is the total Strain energy stored in a body.

a) modulus of resilience

b) impact energy

c) resilience

d) proof resilience

View Answer

Answer: c
Explanation: When a load acts on a body, there is deformation of the body which causes movement of the applied load. Thus work is done is stored in the body as energy and the load is removed this stored energy which is by virtue of strain is called resilience.

8. In cantilever beams, there is ________ stress above neutral axis.

a) Compressive

b) Tensile

c) Temperature

d) Shear

View Answer

Answer: b
Explanation: In a cantilever beam maximum compressive stress occurs at bottom most fibre and maximum tensile stress occurs at the top most fibre and zero at neutral axis hence the tensile stresses lies above the neutral axis.

9. The product of modulus of elasticity (E) and polar moment of inertia (J) is called torsional rigidity.

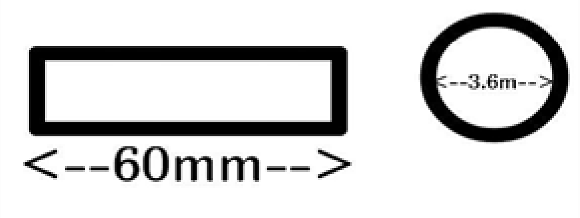
a) True

b) False

View Answer

Answer: b
Explanation: The product of the modulus of rigidity (C) and polar moment of inertia (J) is called torsional rigidity and it produces a twist of one radian in a shaft of unit length.

10. Calculate the maximum stress due to Bending in a steel strip of 30 mm thick and 60 mm wide is bent around a circular drum of 3.6 m diameter [Take Young's modulus = 200kN/m^2].



a) 2341.76 N/mm^2

b) 1666.67 N/mm^2

c) 5411.76 N/mm^2

d) 4666.67 N/mm^2

View Answer

Answer: b
Explanation: Thickness of steel strip = 30 mm; b = 60 mm; d = 3.6m
R = 3.6/2 = 1.8 m
E = 200 kN/m^2
y = 30/2 = 15 mm
E/R = f/y ; f = 200000×15/1800
= 1666.67 N/mm^2.

11. The strength of beams depend merely on________

a) Modulus section

b) Moment of inertia

c) Flexural rigidity

d) Moment of resistance

View Answer

Answer: a
Explanation: The ratio of moment of inertia to the distance to the extreme fibre is called modulus of section. The Beam is stronger when section modulus is more. The strength of beam depends on section modulus. The beams of same strength mean section modulus is same for the beams.
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12. The steel plate is bent into a circular path of radius 10 metres. If the plate section be 120 mm wide and 20 mm thick, then calculate the maximum bending stress. [Consider Young's modulus = 200000 N/mm^2].

a) 350 N/mm^2

b) 400 N/mm^2

c) 200 N/mm^2

d) 500 N/mm^2

View Answer

Answer: c
Explanation: R = 10000 mm; y = 20/2 = 10 mm; E = 200000 N/mm^2
By bending equation we have E/R = f/y
f = 200000×10 / 10000
= 200 N/mm^2.
Section Modulus

1. What is the section modulus (Z) for a rectangular section?

a) $bd^2/6$

b) $a^3/6$

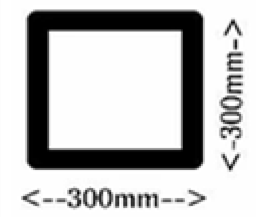
c) BD^3-bd^3

d) D^4-d^4

View Answer

Answer: a
Explanation: The modulus of section may be defined as the ratio of moment of inertia to the distance to the extreme fibre. It is denoted by Z.
Z= I/y ; For rectangular section, I = $bd^3/12$ & y = d/2.
Z= $bd^2/6$.

2. Find the modulus of section of square beam of size 300×300 mm.



a) 4.8×10^6 mm^3

b) 4.5×10^6 mm^3

c) 5.6×10^6 mm^3

d) 4.2×10^6 mm^3

View Answer

Answer: b
Explanation: Here, a = side of square section = 300 mm.
I = $a^4/12$. y= a/2.
Z = I/y = $a^3/6$
= $300^3/6$
= 4.5×10^6 mm^3.

3. _________ of a beam is a measure of its resistance against deflection.

a) Strength

b) Stiffness

c) Deflection

d) Slope

View Answer

Answer: b
Explanation: A beam is said to be a strength when the maximum induced bending and shear stresses are within the safe permissible stresses stiffness of a beam is a measure of its resistance against deflection.

4. To what radius an Aluminium strip 300 mm wide and 40mm thick can be bent, if the maximum stress in a strip is not to exceed 40 N/mm^2. Take young's modulus for Aluminium is 7×105 N/mm^2.

a) 45m

b) 52m

c) 35m

d) 65m

View Answer

Answer: c
Explanation: Here, b = 300mm
d= 40mm. y= 20mm.
From the relation; E/R = f/y
R= E×y/f
$=70\times10^3 \times 20 / 40$
= 35m.

5. The bending stress in a beam is ______ to bending moment.

a) Less than

b) Directly proportionate

c) More than

d) Equal

View Answer

Answer: b
Explanation: As we know, the bending stress is equal to bending moment per area. Hence, as the bending (flexure) moment increases/decreases the same is noticed in the bending stress too.

6. The Poisson's ratio for concrete is __________

a) 0.4

b) 0.35

c) 0.12

d) 0.2

View Answer

Answer: d
Explanation: The ratio of lateral strain to the corresponding longitudinal strain is called Poisson's ratio. The value of poisons ratio for elastic materials usually lies between 0.25 and 0.33 and in no case exceeds 0.5. The Poisson's ratio for concrete is 0.20.

7. The term "Tenacity" means __________

a) Working stress

b) Ultimate stress

c) Bulk modulus

d) Shear modulus

View Answer

Answer: b
Explanation: The ultimate stress of a material is the greatest load required to fracture the material divided by the area of the original cross section in the point of fracture The ultimate stress is also known as tenacity.

8. A steel rod of 25 mm diameter and 600 mm long is subjected to an axial pull of 40000. The intensity of stress is?

a) 34.64 N/mm^2

b) 46.22 N/mm^2

c) 76.54 N/mm^2

d) 81.49 N/mm^2

View Answer

Answer: d
Explanation: Cross sectional area of steel rod [Circular]be 490.87 mm^2.
The intensity of stress = P/A = 40000/490.87
= 81.49 N/mm^2.

9. The bending strain is zero at ________

a) Point of contraflexure

b) Neutral axis

c) Curvature

d) Line of action of loading

View Answer

Answer: b
Explanation: The neutral axis is a line of intersection of neutral plane or neutral layer on a cross section. The neutral axis of a beam passes through the centroid of the section. At the neutral axis bending stress and bending strain is zero.

10. Strength of the beam depends only on the cross section.

a) True

b) False

View Answer

Answer: b
Explanation: The strength of two beams of the same material can be compared by the section modulus values. The strength of beam depends on the material, size and shape of cross section. The beam is stronger when section modulus is more, strength of the beam depends on Z.

Strength of Section due to Section Modulus

1. The moment which resists the external bending is called ______

a) Moment of shear

b) Tolerating moment

c) Moment of resistance

d) Maximum bending moment

View Answer

Answer: c
Explanation: The tensile and compressive stresses developed in the beam section from a couple whose moment is equal to the external bending moment. The moment of this couple which resists the external bending is known as moment of resistance [MR].

2. _______ strength is caused by a moment of resistance offered by a section.

a) Shear

b) Flexural

c) Axial

d) Longitudinal

View Answer

Answer: b
Explanation: The moment of couple with resists action of bending moment is a moment of resistance and the flexural strength possessed by section is the moment of resistance offered by it.

3. A Steel rod 200 mm diameter is to be bent into a circular arc section. Find radius of curvature. Take f = $120 N/mm^2$ & $E = 2\times10^5 N/mm^2$.

a) 134m

b) 166m

c) 162m

d) 174m

View Answer

Answer: b
Explanation: Diameter of Steel rod = 200mm; y = d/2 = 100mm.
$f= 120N/mm^2$.
$E= 2\times10^5 N/mm^2$.
By flexural equation we have f/y = E/R
$R = 2\times10^5/ 120 \times100$
= 166.6m.

4. The hoop stress is also known as _______

a) Parametrical stress

b) Surface stress

c) Circumferential stress

d) Lateral stress

View Answer

Answer: c
Explanation: The stress which is developed in the walls of the cylinder due to internal fluid pressure and which acts tangential to the circumference is called hoop stress or circumferential stress.
Total pressure = p × A.

5. The _____ of strongest beam that can be cut out of a circular section of diameter D.

a) Load

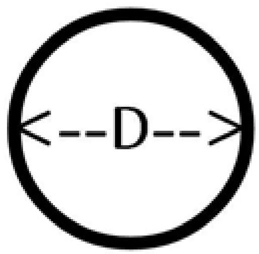
b) Size

c) material

d) cross section

View Answer

Answer: b
Explanation: The size of the strongest Beam that can be cut out of a circular section of diameter D is



Depth; d = Square root of 2/3
b = D / square root of 3.
Among the given sections for the same depth I section gives maximum strength.

6. The moment resisting capacity of the cross section of a beam is termed as _______ of the beam.

a) Stiffness

b) Strength

c) Modulus

d) Inertia

View Answer

Answer: b
Explanation: The moment resisting capacity of the cross section of a beam is termed as the strength of the beam. The bending stress is maximum at the extreme fibres of the cross section. The strength of the two beams of same material can be compared by the sectional modulus values.

7. Find the moment of resistance of rectangular beam off grid to 40 mm depth 400 mm if the bending stress is $15\ N/mm^2$.

a) 78 kNm

b) 84 kNm

c) 96 kNm

d) 132 kNm

View Answer

Answer: c
Explanation: Moment of resistance (MR) = Z × f
= bd^2 / 6 × 15
= 96×10^6 Nmm.

8. A rectangular beam 100 mm wide is subjected to a maximum shear force and 50 kN. Find the depth of the beam.

a) 350 mm

b) 185 mm

c) 200 mm

d) 250 mm

View Answer

Answer: d
Explanation: Let the depth of the beam be d
Maximum shear stress = 3/2 (Average Shear stress)
d= 3×5000/ 3×2×100.

9. What is the approximate value of coefficient of linear expansion for steel?

a) 13×10^{-6}6 /°C

b) 11.5×10^{-6} /°C

c) 12×10^{-6} /°C

d) 16×10^{-6} /°C

View Answer

Answer: b
Explanation: The increase in length of body per unit rise of temperature in original name is termed as coefficient of linear expansion and it is denoted by Greek letter alpha. Coefficient of linear expansion for steel is 11.5×10^{-6} /°C. For copper it is 17×10^{-6} /°C.

10. A hollow shaft has outside diameter 120 mm and thickness 20 mm. Find the polar moment of inertia (J).

a) 16.36×10^6 mm^4

b) 14.65×10^6 mm^4

c) 10.32×10^6 mm^4

d) 23.18×10^6 mm^4

View Answer

Answer: a
Explanation: D = 120mm
t= 20mm & d = D – 2t = 80mm.
Polar moment of inertia (J) is $\pi/32 \times [D^4 - d^4]$.
$\pi/32 \times [120^4 - 80^4]$.
16.36×10^6 mm^4.
Bending Stress in Unsymmetrical Sections

1. Unsymmetrical bending occurs due to _______

a) The Beam cross section is unsymmetrical

b) The shear Centre does not coincide with the neutral axis

c) The Beam is subjected to trust in addition to bending moment

d) The bending moment diagram is unsymmetrical

View Answer

Answer: d
Explanation: If the bending moment diagram of a beam seems to unsymmetrical, then with respect to that diagram, the bending is said to be unsymmetrical bending.

2. A body having similar properties throughout its volume is said to be ______________

a) Isotropic

b) Homogeneous

c) Continuous

d) Uniform

View Answer

Answer: b
Explanation: A body having similar properties throughout its volume is said to be "homogeneous" and the material which exhibits the same elastic properties in all directions is called "isotropic".

3. Principal plane has _____________

a) Maximum shear stress

b) Maximum tensile stress

c) Zero shear stress

d) Minimum bending stress

View Answer

Answer: c
Explanation: Principal stress is a magnitude of direct stress, across a principal plane which is a particular plane having no shear stress at all.

4. Calculate the Strain energy that can be stored in a body to be pulled with 100 N/mm^2 stress (f) and E = 2×10^5 N/mm^2.

a) 0.9 kNm

b) 0.05kNm

c) 0.87kNm

d) 0.54kNm

View Answer

Answer: b
Explanation: Strain energy stored in the body be "U" = f^2/ 2 E × Volume.
= 100^2/ $2\times2\times10^5$
= 0.05 kNm.

5. Materials exhibiting time bound behaviour are known as ________

a) Isentropic

b) Reactive

c) Fissile

d) Visco elastic

View Answer

Answer: d
Explanation: Materials exhibiting time bound behaviour popularly known as visco elastic and if a body having similar properties throughout its volume it is known as homogeneous and according to one assumption, the concrete is considered to be homogeneous material.

6. What are the units of true strain?

a) Kg/m^2

b) Kg/ m^3

c) No dimensions

d) N/mm

View Answer

Answer: c
Explanation: As we know strain is the ratio of change in dimension to the original dimension. It is denoted by "e". Metres/metres hence no dimensions.

7. Revert size is generally expressed in terms of ________

a) Shank width

b) Girder length

c) Lap length

d) Shank diameter

View Answer

Answer: d
Explanation: Rivets are ductile metal pins of often used for joining structure members as in case of trusses, stanchions plate girders, cylindrical shells etc. The distance between two heads is known as shank and rivet size is generally expressed in terms of shank diameter.

8. _________ joints are necessary to keep a structure safe against shrinkage.

a) Construction

b) Functional

c) Transverse

d) Longitudinal

View Answer

Answer: b
Explanation: Functional joints are necessary to keep the structures safe against shrinkage, expansion sliding and warping of concrete. These types of joints are made by forming continuous breaks in large continuous areas of structures at suitable distance apart. The joints or breaks may be 6 to 38 mm wide.

9. The specific gravity of sand is ___________

a) 2.8

b) 2.25

c) 3.2

d) 2.65

View Answer

Answer: d
Explanation: The specific gravity of sand is 2.65.

Materials	Specific gravity
Trap	2.9
Gravel	2.66
Granite	2.8
Sand	2.65

10. To what radius a silver strip 200 mm wide and 40 mm thick can be bent if the maximum stress in the ship is 80 N/mm^2. Young's modulus for Silver is 80×10^3 N/mm^2.

a) 20m

b) 30m

c) 15m

d) 35m

View Answer

Answer: a
Explanation: Here, b = 200 mm; d = 40mm

y = 40/2 = 20 mm
f = 80N/mm^2
From the relation; E/R = f/y
R = E×y / f
= 80000×20 / 80
= 20000mm = 20m.
Composite or Flitched Beams

1. In flitched beams _______ remains same for both materials.

a) Stress

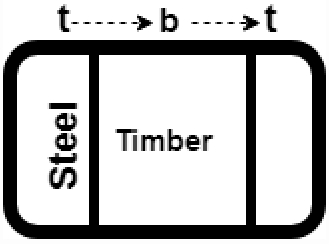
b) Strain

c) Section modulus

d) Young's modulus

View Answer

Answer: b
Explanation: Due to bending, the strain will be same in both the materials.



A timber beam strengthened by steel strips.
Where E of timber / E of steel = m
The equivalent width = b + 2mt.

2. What is the moment due to dead load in case of continuous beams at the middle of interior spans?

a) w L^3 / 12

b) w L^2/ 14

c) w 3/ 20

d) w L^2 / 24

View Answer

Answer: d
Explanation: The moment due to dead load in case of continuous beams at the middle of interior spans is w L^2 / 24.

Position	Moment due to dead load
Near middle of end span	W L^2/ 12
At the middle of interior span	W L^2/ 24
At the support next to and support	-W L^2/ 22

.

3. A continuous beam is one which is _______

a) Infinitely long

b) Supported at two points

c) Supported it more than two supports

d) Supported by a prop

View Answer

Answer: c
Explanation: A beam which is supported by more than two supports is known as a continuous beam. In this beam, bending moment is low and hence the deflection in the beam is also comparatively less. This beam is stiffer when compared to the other traditional beams.

4. The effective length of column depends upon ________

a) the cross section of beam

b) end conditions

c) maximum bending moment

d) extreme fibres

View Answer

Answer: b
Explanation: The effective length of column depends upon end conditions.

End condition	Effective length
Both ends hinged	L
Both ends fixed	L/2
One end is fixed and other end free	2L

5. The phenomenon under which the strain of material varies under constant stress is known as ________

a) Creep

b) Hysteresis

c) Viscoelasticity

d) Strain hardening

View Answer

Answer: a
Explanation: A creep is a plastic deformation underweight the strain of material where is under constant stress this is one of the mechanical properties of the engineering materials. The best example is the failure of concrete.

6. Volumetric strain = 3× _____ strain.

a) Lateral

b) Linear

c) Composite

d) Yield

View Answer

Answer: b
Explanation: eV (volumetric strain) = 3× linear strain = 3×e
The volumetric strain is algebraic sum of all the linear(or) axial strain when a solid to be subjected to equal normal sources of the same type of all faces we will have €x, €y and €z equal in value. In this case the volumetric strain will be 3 times the linear strain in any of the three axes.

7. The stress corresponding to breaking point is known as ______________

a) yield stress

b) ultimate stress

c) breaking stress

d) normal stress

View Answer

Answer: c
Explanation: After reaching ultimate stress, the stress strain curve suddenly falls with rapid increase in strain and specimen breaks. The stress corresponding to breaking point is known as breaking stress and it is denoted by G.

8. Determine the yield stress of a steel rod 20 mm diameter, if the yield load on the steel rod is 88kN.

a) 240.55 N/mm^2

b) 280.25 N/mm^2

c) 325 N/mm^2

d) 290.45 N/mm^2

View Answer

Answer: b
Explanation: Initial area of the Steel rod of 20 mm = 314 mm^2 [area of circle] Yield stress = yield load/ Area
= $88 \times 10^3 / 314$
= 280.25 N/mm^2.

9. What is the elongation percentage of a steel rod of 50 mm diameter if the total extension is is 54 mm and gauge length is 200 mm.

a) 27%

b) 23%

c) 43%

d) 35%

View Answer

Answer: a
Explanation: Percentage elongation = Total extension / Gauge length × 100
= 54/200 × 100
= 27%.
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10. ___________ joints are provided when there is a break in the concreting operation.

a) transverse joints

b) longitudinal joints

c) construction joints

d) warpage joints

View Answer

Answer: c
Explanation: The construction joints are provided when there is a break in a concreting operation. Although the effort is always made to complete the concrete work in one day, sometimes it is not possible and therefore, construction joints are provided. For beams, the joints should be at the centre of the span or within the middle third.
Introduction to Shear Stress

1. At _________ the shearing stress in a beam are maximum.

a) Extreme fibres

b) Modulus of section

c) Neutral axis

d) Along the cross-sectional area

View Answer

Answer: c
Explanation: Shearing stress in a beam is maximum at the neutral axis. Shearing stress is defined as the resistance offered by the internal stress to the shear force.

2. Determine the shear stress at the level of neutral axis, if a beam has a triangle cross section having base "b" and altitude "h". Let the shear force be subjected is F.

a) 3F/8bh

b) 4F/3bh

c) 8F/3bh

d) 3F/6bh

View Answer

Answer: c
Explanation: For a triangular section subjected to shear force the shear stress in neutral axis is
Shear stress at NA = 4/3 [Average shear stress].
= 4/3 [F/0.5 bh] = 8F / 3bh.

3. The maximum shear stress is _______ times the average shear stress [For rectangular beams].

a) 2.5

b) 3

c) 1.2

d) 1.5

View Answer

Answer: d
Explanation: The maximum shear stress occurs at neutral axis. Then y = 0.
Max shear stress = 3F/2bd = 3/2 [F/bd].
= 1.5 Average shear stress.

4. Shear stress in a beam is zero at _______

a) Neutral axis

b) Extreme fibres

c) Cross section

d) Junctions

View Answer

Answer: b
Explanation: The resistance offered by the internal stress to shear is known as shearing stress. Shearing stress is zero at extreme fibres of the beam. The bending stresses are maximum at extreme fibres of the beam cross section.

5. Shear stress distribution over rectangular section will be _________

a) parabolic

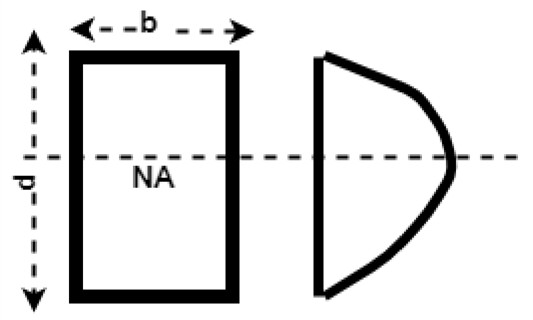
b) elliptical

c) triangular

d) trapezoidal

View Answer

Answer: a
Explanation:



Maximum shear stress is 1.5 times that of average shear stress.
The shear stress distribution is parabolic.

6. A round Steel rod of 100 mm diameter is bent into an arc of radius 100m. What is the maximum stress in the rod? Take E = 2×10^5 N/mm^2.

a) 150 N/mm^2

b) 200 N/mm^2

c) 100 N/mm^2

d) 300 N/mm^2

View Answer

Answer: c
Explanation: D = 100m
y = 50 mm
R = 10×10^3mm
By equation of flexure; E/R = f/y
f=E/R ×y
= 2×10^5/ 100 × 10^3× 50
= 100 N/mm^2.

7. For circular section, the maximum shear stress is equal to ____________ times of average shear stress.

a) 2/3

b) 3/2

c) 4/3

d) 3/4

View Answer

Answer: c
Explanation: Maximum shear stress occurs at neutral axis & y = 0.
Max. Shear stress = 4/3 [F/A].
F/A is average shear stress.
The maximum shear stress distribution is 33% more than average shear stress.

8. A steel beam is 200 mm wide and 300 mm deep. The beam is simply supported and carries a concentrated load w. If the maximum stress are 2 N/mm^2. What will be the corresponding load?

a) 50 kN

b) 80 kN

c) 40 kN

d) 85 kN

View Answer

Answer: b
Explanation: For a rectangular cross section
Max. Shear stress = 3/2 [F/A] 2 = 3/2 [w/200 × 300].
w = 80 kN.

9. Maximum shear stress in thin cylindrical shell be ___________

a) pr/2t

b) pr/3t

c) pr/4t

d) pr/ 5t

View Answer

Answer: c
Explanation: Hoop stress P(h) = pr/t
Longitudinal stress P(l) = pr/2t
Thus, hoop stress is twice the longitudinal stress
Max. Shear stress = P(h) – P(l) / 2
= pr/4t.

10. Circumferential stress is same as of _________

a) Hoop stress

b) Longitudinal stress

c) Transverse stress

d) Phreatic stress

View Answer

Answer: a
Explanation: In a thin cylindrical shell of internal radius r thickness t when subjected to internal fluid pressure P, the stress developed in the internal walls can be termed as circumferential stress or hoop stress.
P(h) = pr/t.

Shear Stress Distribution in Various Sections

1. A beam has a triangular cross-section, having altitude ”h” and base “b”. If the section is being subjected to a shear force “F”. Calculate the shear stress at the level of neutral axis in the cross section.

a) 4F/5bh

b) 4F/3bh

c) 8F/3bh

d) 3F/4bh

View Answer

Answer: c
Explanation: For a triangular section subjected to a shear force, the shear stress at neutral axis is
= 4/3 × average shear stress
= 4/3 × F/A/2 ; A = bh
= 8F/3bh.

2. The maximum shear stress in the rectangular section is _______________ times the average shear stress.

a) 3/4

b) 3/7

c) 5/3

d) 3/2

View Answer

Answer: d
Explanation: The maximum shear stress occurs at the neutral axis. So, y = 0.
Maximum shear stress = 3/2 × F/bd (• Average shear stress = F/bd).
= 3/2 × average shear stress.

3.The modular ratio for M20 grade concrete is ______________

a) 16

b) 13

c) 11

d) 07

View Answer

Answer: b
Explanation: According to Indian Standards 456-2000 The modular ratio (m) = 280/3× cbc, For M20; compressive bearing capacity in concrete = 7 N/mm^2 & tensile strength = 330 N/mm^2.
Modular ratio (m) = 280/21 = 13.33.

4. In doubly reinforced beam, the maximum shear stress occurs _______________

a) along the centroid

b) along the neutral axis

c) on the planes between neutral axis and tensile reinforcement

d) on the planes between neutral axis and compressive reinforcement

View Answer

Answer: d
Explanation: In continuous beam the moments developed at the supports are greater than a moment's developed at the mid span, show the maximum bending moment occurs at the supports.
For continuous beams, the maximum shear stress occurs at the planes intersecting the compressive reinforcement and the neutral axis.

5. A cylindrical section having no joint is known as ________________

a) Proof section

b) Seamless section

c) Target section

d) Mown section

View Answer

Answer: b
Explanation: A cylindrical section having no joint is known as seamless section. Built up section is not that strong as a seamless section of the same thickness.

6. The efficiency of cylindrical section is the ratio of the strength of joint to the strength of _______________

a) Solid plate

b) Boilerplate

c) Circumferential plate

d) Longitudinal plate

View Answer

Answer: a
Explanation: The strength of plate or strength of rivet whichever is less is called the strength of joint. The ratio of the strength of joint to the strength of steel plate is called the efficiency of the cylinder.

7. Calculate the modulus of section for a hollow circular column of external diameter 60 mm and 10 mm thickness.

a) 170 m

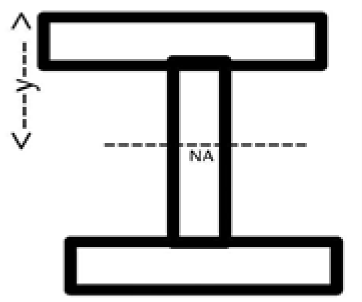
b) 190 m

c) 250 m

d) 300 m

View Answer

Answer: a
Explanation: Given data :
D = 60 mm ; t = 10 mm & d = 60 – 2×10 = 40 mm
For hollow circular section, modulus of section(Z) = 3.14 × $D^4 – d^4$ / 32 D.
= 17016.3 mm = 170 m.



8. Determine the modulus of a section for an I section, given the distance from neutral axis is 50 mm and moment of inertia is 2.8×10^6 mm^4.

a) 59m

b) 51m

c) 58m

d) 63m

View Answer

Answer: c
Explanation: The modulus of section is the ratio of the moment of inertia to the distance of the neutral axis.
Given y = 50 mm
I = 2.8×10^6 mm^4.
& Z = I/y = 2.8×10^6 / 50
= 57.76 $\times10^3$ mm
= 57.7 ~ 58 m.

9. A circular Beam of 0.25 m diameter is subjected to you shear force of 10 kN. Calculate the value of maximum shear stress. [Take area = 176 m^2].

a) 0.75 N/mm^2

b) 0.58 N/mm^2

c) 0.73 N/mm^2

d) 0.65 N/mm^2

View Answer

Answer: a
Explanation: Given diameter = 0.25 m
Area (A) = 176 m^2
Shear Force (F) = 10 kN ~ 10000 N.
For circular cross section the maximum shear stress is equal to 4/3 times of average shear stress
Maximum shear force = 4/3 × F/A
= 4/3 × 10000/176
= 0.75 N/mm^2.

10. The maximum shear stress distribution is _____________ percentage more than average shear stress in circular section.

a) 54 %

b) 60 %

c) 33 %

d) 50 %

View Answer

Answer: c
Explanation: Maximum shear stress occurs at neutral axis; y =0
Maximum shear stress = 16/3 × average shear stress
But 4F / A is the average shear stress.
So, the maximum shear stress = 4/3 times the average shear stress.
Hence the maximum shear stress is 33% more than the average shear stress in a circular section.
Maximum Shear Stress – 1

1. Shear stress at top most fibre of rectangular section is _____________

a) Maximum

b) Minimum

c) Zero

d) Uniform through out

View Answer

Answer: c
Explanation: In rectangular section,
The shear stress at a distance "y " from NA = $6F/bd^3 \times u$ ($u = d^2/4$-y)
The maximum shear stress occurs at a neutral axis, in the above equation when y is equal to zero. q is max.
Hence the shear stress topmost fibre of rectangular section is zero.

2. 1 GPA = ____________ pa.

a) 10^5

b) 10^6

c) 10^8

d) 10^9

View Answer

Answer: d
Explanation: 1 Giga Pascal is equal to $10^9 N/m^2$(Pascal)
In the same way 1 kilo Pascal equal to 10^3 pascals
1 mega Pascal is equal to 106 pascals.

3. The maximum shear stress in an I section is __________

a) $F/8I \times [B/b (D^2-d^2)+d^2]$

b) $F/6I \times [B/b (D^2-d^2)+d^2]$

c) $F/8I \times [B/b (D^3-d^3)+d^2]$

d) $F/4I \times [B/b (D^2-d^2)+d^2]$

View Answer

Answer: a
Explanation: Shear stress at top flange of the I section is zero.
Shear stress at the junction of web and flange= $B/b \times F/8I (D^2-d^2)$.
Shear stress at bottom of the flange = $F/8I (D^2-d^2)$.
And shear force is maximum at neutral axis i.e $F/8I \times [B/b (D^2-d^2)+d^2]$.

4. Find the modulus of section of square beam of size 150 × 150 mm?

a) $654.5m^3$

b) $550.85m^3$

c) $562.5m^3$

d) $586.9m^3$

View Answer

Answer: c
Explanation: Here, a = side of a square section = 150 mm.
Moment of inertia for square section = $a^4/12$; y=a/2.
Section modulus $Z = I/y = a^3/6 = 150^3/6 = 562.5 \times 10^3$ mm^3.

5. In steel sections, the junction between a flange and web is known as ________

a) Edge

b) Fillet

c) Corner

d) Lug

View Answer

Answer: b
Explanation: In a steel section, the junction between the flange and the web is known as fillet. The connections solve issues of complex geometry for joining the members of a central hub while they provide the standard connection through out. They are not readily available.

6. The percentage of carbon in structural steel is __________

a) 0.2 – 0.27 %

b) 0.6 – 0.85 %

c) 0.7 – 1.23 %

d) 1.23 – 1.45%

View Answer

Answer: a
Explanation: The percentage of carbon in structural steel is 0. 2 to 0.27. Percentage of the carbon in steel increases the ductility of the Steel decreases.

7. The minimum percentage elongation for mild steel is __________

a) 6%

b) 13%

c) 23%

d) 34%

View Answer

8. GOST standards are used in _________

a) Italy

b) Poland

c) Russia

d) Pakistan

View Answer

Answer: c
Explanation: GOST is an acronym for gosudastvennyy standard used in Russia.
It usually carries two part number, one indicates serial number and other indicates the year of issue
For example; GOST 155-70.

9. The allowable tensile stresses in steel structures is taken as 1500 kg /cm2 to ______

a) 1765 kg /cm^2

b) 1900 kg /cm^2

c) 2125 kg /cm^2

d) 2455 kg/cm^2

View Answer

Answer: c
Explanation: Steel structures are available in various sections such as rolled I beams, channels, angle iron, bars, flat plates etc. The allowable tensile stress in steel structures is 1500 kg /cm^2 to 2125 kg /cm^2.

10. As per IS:800, the minimum thickness of web should not be less than ______

a) d/250

b) d/300

c) d/350

d) d/125

View Answer

Answer: a
Explanation: As per IS: 800, the minimum thickness of web should not be less than d/250; [Where d = clear distance between Flange angles]. In case of unstiffened web, the minimum thickness of web plate should not be less than d/85.

11. The failing of a very long column is initially by ___________

a) Crushing

b) Collapsing

c) Buckling

d) Twisting

View Answer

Answer: c
Explanation: The members considerably long in comparison of lateral dimensions are called Long columns. The members essentially fail by buckling (or) crippling to bending. According to Euler's formula the long column can be determined.

12. What is the allowable stress in cast iron?

a) 3200 N/mm^2

b) 2400 N/mm^2

c) 3400 N/mm^2

d) 5500 N/mm^2

View Answer

Answer: d
Explanation: The allowable stress in cast iron is 5500 N/mm^2.

Position	Stress (N/mm^2)	Rankine's Constant
Mild steel	3200	1/7500
Wrought iron	2500	1/9000
Cast iron	5500	1/1600

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13. Modulus of resilience is defined as __________

a) Resilience at ultimate stress

b) Resilience per unit volume

c) Resilience at proportional limit

d) Resilience at elastic limit

View Answer

Answer: b
Explanation: The resilience per unit volume is defined as modulus of resilience. It is a property of the material. The Modulus of resilience is equal to 1Mpa for Steel with the proportionality limit of 200 Mpa.

14. A spring used to absorb shocks and vibrations is called as ________

a) Conical spring

b) Leaf spring

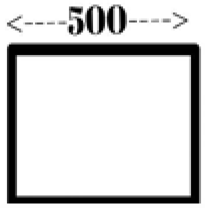
c) Disc spring

d) Torsion spring

View Answer

Answer: b
Explanation: A leaf spring used to absorb shocks and vibrations and the springs in brakes and clutches are invariably used in order to apply forces.

15. A rectangular beam of 500 mm wide is subjected to maximum shear force of 250kN, the corresponding maximum shear stress been 3 N/mm^2. The depth of the beam is equal to _______



a) 200mm

b) 250mm

c) 300mm

d) 350mm

View Answer

Answer: b
Explanation: The maximum shear force in a rectangular section is $3N/mm^2$.
In rectangular sections; Maximum shear force = 3/2 ×[F/bd] & 3 = 3/2 ×[250 $\times 10^3$/ 500 × d] d = 250mm.
Maximum Shear Stress – 2

1. Calculate the maximum shear force for square beam of side is 320 mm. If the shear force is 94kN.

a) $1.37N/mm^2$

b) $2.36N/mm^2$

c) $5.21N/mm^2$

d) $4.32N/mm^2$

View Answer

Answer: a
Explanation: Maximum shear force is 3/2 × F/a×a (a = side of square)
= 3/2 × 94×10^3/320×320
= 1.3769 N/mm^2.

2. A simply supported beam of span 8 metres carries a udl of 16 kN/m at a point out of 60 kN acting at it's centre. Calculate the maximum shear force.

a) 87kN

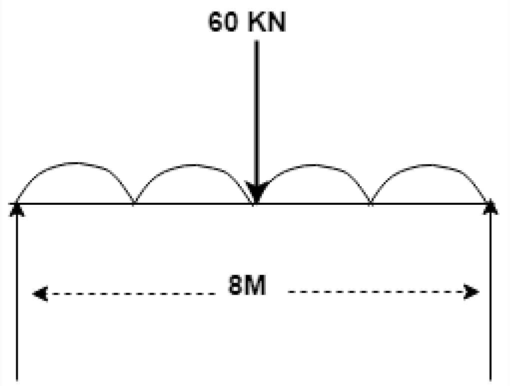
b) 45kN

c) 78kN

d) 94kN

View Answer

Answer: d
Explanation: Maximum shear force is w×l/2
= 60+16×8 / 2
= 94 kN.



3. The ratio of creep strain to elastic strain is known as ___________

a) Creep factor

b) Creep postulate

c) Creep coefficient

d) Creep variable

View Answer

Answer: c
Explanation: Creep is defined as plastic deformation under a constant load or stress the creep Coefficient which is defined as the ratio of ultimate creep strain to the elastic strain at various ages of loadings.

4. Poisson's ratio for high strength concrete is __________

a) 0.049

b) 0.095

c) 0.1

d) 0.1111

View Answer

Answer: c
Explanation: Poisons ratio varies between 0.1 for high strength concrete and 0.2 for weak concrete. Usually it is taken as 0.15 for strength design and 0.2 for serviceability conditions.

5. Partial safety factor for concrete is taken as ____________

a) 1.3

b) 1.2

c) 1.5

d) 1.6

View Answer

Answer: c
Explanation: A higher value of partial safety factor for concrete 1.5 has been adopted because there are greater chances of variation of the strength of concrete due to improper compaction, inadequate curing, improper batching and mixing.

6. The design compressive strength of concrete is ____________ times of characteristic compressive strength of concrete.

a) 0.313

b) 0.253

c) 0.466

d) 0.411

View Answer

Answer: c
Explanation: The compressive strength of concrete in the structure is assumed to be 0.67 times the characteristic strength of concrete. The partial safety factor equal to 1.5 is applied to the strength of concrete in addition to it therefore the design compressive strength of concrete is 0.67 fck / 1.5 equal to 0.446 fck. [fck = characteristic compressive strength].

7. In cantilever beams, the steel bars are placed at ____________

a) Bottom of the beam

b) Top of the Beam

c) Midspan of the Beam

d) Near supports

View Answer

Answer: b
Explanation: In cantilever beams, steel bars are placed near the top of the beam to resist the tensile stresses developed in top layers due to the negative bending moment that is hogging bending moment.

8. Calculate the level arm factor of a section of M20 grade and if Fe 415 Steel. [Take critical neutral axis factor as 0.289].

a) 0.78

b) 0.9

c) 0.58

d) 0.73

View Answer

Answer: b
Explanation: Lever arm factor (j) = 1-k/3
Where k= 0.289
j = 1-0.289/3
= 0.904~0.9.

9. Working stress method is based on elastic theory assumptions.

a) True

b) False

View Answer

Answer: a
Explanation: Working stress method is based on elastic theory assuming reinforced concrete as elastic material. The stress strain curve of concrete is assumed as linear from zero at the neutral axis to a maximum value at the extreme fibre. In the working stress method, members are designed for working loads such that the stresses developed are within the allowable stress.

10. Modular ratio method is also known as _______

a) Ultimate stress method

b) Limit state method

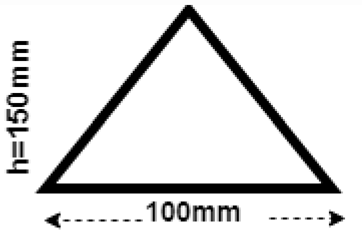
c) Working stress method

d) Stress and strain method

View Answer

Answer: c
Explanation: The stress in steel is linearly related to the stresses in adjoining concrete by constant factor called modular ratio (defined as the ratio of modulus of elasticity of steel to that of concrete) Working stress method is therefore also known as modular ratio method.

11. Find the moment of inertia about centroid axis of a triangular section are having base 100 mm and height 150 mm.



a) $9.21\times10^{6}mm^{4}$

b) $9.45\times10^{6}mm^{4}$

c) 9.37×10^{6} mm^{4}

d) 8.51×10^{6} mm^{4}

View Answer

Answer: c
Explanation: b = 100mm
h = 150 mm
Moment of inertia about centroid Axis = $bh^3 / 36$.
= $100 \times150^3/ 36$
= $9.37\times10^{6}mm^{4}$.

12. The stress corresponding to _______ of strain in the stress-strain curve of mild steel is known as proof stress.

a) 0.2%

b) 0.32%

c) 0.5%

d) 0.6%

View Answer

Answer: a
Explanation: The stress corresponding to 0.2% of strain in the stress-strain curve of mild steel is known as proof stress. This is also taken as yield stress. The maximum stress is generally taken as yield stress.
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13. __________ is the device used for measuring normal stresses on the surface of a stressed object.

a) Nephelometer

b) Straining appurtenances

c) Resistance strain gauge

d) Volt-Hypsometer gauge

View Answer

Answer: c
Explanation: An electrical resistance strain gauge is a device for measuring normal strains on the surface of a stressed object. The gauges are small (less than half inch) made of wires that are bonded on surface of the object. We can use the transformation equations for plane strain to calculate the strains in various directions.

14. The compressive strength of brittle materials is ______ its tensile strength.

a) Less than

b) Greater than

c) Equal to

d) Depends on material

View Answer

Answer: b
Explanation: The compressive strength of brittle materials is always greater than its tensile strength. In the same way, the tensile strength of ductile materials is greater than its compressive strength.

15. The breaking stress is _______ the ultimate stress.

a) Less than

b) Greater than

c) Depends on time

d) Equal to

View Answer

Answer: a
Explanation: The stress corresponding to the ultimate load is known as ultimate stress and the stress corresponding to breaking point is known as breaking stress. In the stress strain curve, the ultimate stress is above the breaking stress. Hence the ultimate stress is greater than breaking stress.
Combined Stress

1. Bond stress for M20 grade concrete in tension is ____________

a) 1.4

b) 1.2

c) 1.5

d) 1.8

View Answer

Answer: b
Explanation: Bond stress is the shear stress acting parallel to the bar on the interface between the reinforcing bar

and the surrounding concrete. Hence it is the stress developed between the contact surface of Steel and concrete to keep them together. The value of M20 designs Bond stress is 1.2 in tension.

2. The formation of diagonal cracks at junctions is due to ________

a) Shear stress

b) Bond stress

c) Temperature stress

d) Lateral stress

View Answer

Answer: a
Explanation: Bending is usually accompanied by shear. The combination of shear and bending stresses produces the principle stresses which causes diagonal tension in the beam section. This should be resisted by providing shear reinforcement in the form of vertical stirrups (or) bent up bars along with stirrups.

3. Calculate the factored bending moment of a rectangular reinforced concrete beam of effective span 4300 mm and load imposed 37.5 kN/m.

a) 100kNm

b) 127kNm

c) 130kNm

d) 145kNm

View Answer

Answer: c
Explanation: Factored load (w) = 1.5×37.5 = 56.25 kN/m.
Factored bending moment for simply supported beam (M) = $wl^2/8$. = $56.25\times(4.3)^2/8$ = 130kNm.

4. Determine the limiting percentage of steel for singly reinforced sections of M20 grade & Fe415.

a) 0.68

b) 0.79

c) 0.96

d) 1.76

View Answer

Answer: c
Explanation: The limiting percentage of steel for singly reinforced sections of M20 grade & Fe415 is 0.96.

Grade of concrete	Limiting percentage of tensile Steel for a Fe415
M15	0.72
M20	0.96
M25	1.19

5. Calculate the limiting depth of the neutral axis for mild steel of effective depth 400 mm.

a) 318mm

b) 212mm

c) 455mm

d) 656mm

View Answer

Answer: b
Explanation: The limiting depth of neutral axis Fe 250 steel is
Xu (max) = 0.53 × d (for Fe250)
= 0.53 × 400
= 212mm.

6. Lap splices should not be used for bars larger than _____ mm.

a) 45mm

b) 54mm

c) 36mm

d) 72mm

View Answer

Answer: c
Explanation: Splices are provided when the length of the bar is less than that required. The splicing of reinforcement is provided either by lap joint or mechanical joint or welded Joint. Lap splices should not be used for bars larger than 36 mm for larger diameter, bars may be welded.

7. Anchorage value for "U" hook is _________

a) 16 × diameter of bar

b) 12 × diameter of bar

c) 10 × diameter of bar

d) 8 × diameter of bar

View Answer

Answer: a
Explanation: Anchorage value for "U" hook is 16 × diameter of bar.

Type of Hook / Bend in degrees	Anchorage Value
U hook	16 × diameter of bar
45 bend	4 × diameter of bar
90 bend	8 × diameter of bar
135 bend	12 × diameter of bar

8. The standard ___________ are provided in deformed bars.

a) Anglets

b) Bends

c) Fillets

d) Lugs

View Answer

9. Transverse bars are also called as _________

a) Main bars

b) Anchor bars

c) Distribution bars

d) Stirrups

View Answer

Answer: c
Explanation: In addition to main bars, along the shorter direction provided at the bottom, minimum reinforcement along the longer span and are also provided on top of the main bars and at right angles to them. These are called distribution bars are transverse bars.

10. A slab supporting only in two edges opposite to each other is _______

a) Two way slab

b) One way slab

c) Continuous slab

d) Cantilever slab

View Answer

Answer: b
Explanation: If the ratio of the longest span the shorter span is greater than 2 or A slab supporting only in two edges (opposite to each other) is called one way slab. This slab spans across shorter span practically.

11. Torsion reinforcement is provided in ___________ slab

a) One way slab

b) Two way slab

c) Simply supported slab

d) Cantilever slab

View Answer

Answer: b
Explanation: A slab supporting on all four edges is known as two way slab. In this slab, the ratio of longest span to the shorter span is less than 2. It requires torsional reinforcement because there's a chance of twisting at corners.

12. Generally in residential buildings, the width of stay is kept as ____________

a) 2m

b) 1m

c) 5m

d) 4m

View Answer

Answer: b
Explanation: The stair consists of series of steps with landings at appropriate intervals. The width of stair depends upon the type of building in which it is provided. Generally, in residential buildings, the width of stair is 1 m.

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13. As per IS 456:2000; the slope or pitch of stairs should be in between 25 ° to ___________

a) 45°

b) 90°

c) 40°

d) 120°

View Answer

Answer: c
Explanation: Each step has one tread and one rise. As per IRC, the tread is in between 250mm to 300 mm. The slope or pitch of the stairs should be in between 25° to 40°.

14. When space is less, the ___________ staircases is much preferred.

a) Open well

b) Dog legged

c) Spiral stair

d) Circular

View Answer

Answer: b
Explanation: The most common type of Stairs arranged with two adjacent flights running parallel with mid landing. Where the space is less, dog legged staircase is generally provided resulting in economical utilisation of available place.

15. The ______________ of a column is the distance between the points of zero bending moments.

a) Slenderness ratio

b) Eccentricity

c) Radius of gyration

d) Effective length

View Answer

Answer: d
Explanation: Effective length of a column is the distance between the points of zero bending moments (point of contra flexure) of a buckled column the effective length of the column depends upon the unsupported length and the end conditions.

Bending Stress Due to Eccentric Loading

1. Eccentrically loaded structures have to be designed for _______

a) Uniaxial force

b) Biaxial force

c) Combined axial force

d) Combined biaxial force

View Answer

Answer: c
Explanation: When the line of action of the resultant compressive force doesn't coincide with the centre of gravity of the cross section of the structure, it is called eccentrically loaded structure. They have to be designed for combined axial force.

2. ______ transfer the loads from beams or slabs to footings or foundations.

a) Pedestal

b) Post

c) Rib

d) Column

View Answer

Answer: d
Explanation: A vertical member whose effective length is greater than 3 times its least lateral dimension carrying compressive loads is called a column. The main function of column is to transfer the loads from the beams or slabs to the footings or foundation.

3. In long columns, the lateral deflection causes at the ______

a) Supports

b) Throughout

c) Midspan

d) Along outer periphery

View Answer

Answer: c
Explanation: A long column under the action of axial loads deflects laterally causing maximum deflection at the centre. A long column fails due to buckling.

4. Short columns causes deflection in the structure.

a) True

b) False

View Answer

Answer: b
Explanation: If the ratio of the effective length of the column to the least lateral dimension is less than 12. The column is called a short column. It fails by crushing (pure compression failure) and there is no chance of causing deflections.

5. The approximate percentage of reinforcement provided in a beam varies from _______

a) 1-2%

b) 1-4%

c) 2-3%

d) 3-4%

View Answer

Answer: a
Explanation: The approximate percentage of reinforcement provided in a beam varies from 1-2%.

Type of Structure	Approx. % of Steel
Beam	1-2%
Slabs	0.7-1%

Columns	1-4%

6. To avoid the failure of a column by buckling ____________ limits are to be recommended.

a) Slenderness

b) Effective length

c) Kernel

d) Radius of gyration

View Answer

Answer: a
Explanation: The column dimensions shall be such that it fails by material failure only (crushing due to compression) and not by buckling. To avoid the failure of column buckling clause 25.3 of IS 456 recommends the slenderness limits for the column.

7. According to IS 456- 2000, the minimum eccentricity subjected to a column is ___________

a) 30mm

b) 20mm

c) 45mm

d) 50mm

View Answer

Answer: b
Explanation: No column can have a perfectly axial load. There may be some moments acting due to the imperfection of construction or due to actual conditions of loading when IS 456-2000, recommends that all columns Shall be designed for minimum eccentricity of 20 mm.

8. Radius of gyration is denoted by __________

a) k

b) n

c) e

d) y

View Answer

Answer: a
Explanation: The radius of gyration about a given axis is defined as the effective distance from the given axis at which the whole area may be considered or located. It is denoted by “k” or “r”. The units for the radius of gyration are mm.

9. Find the moment of inertia of a rectangular section of 40 mm width and 80 mm depth about the base.

a) $632\times10^4mm^4$

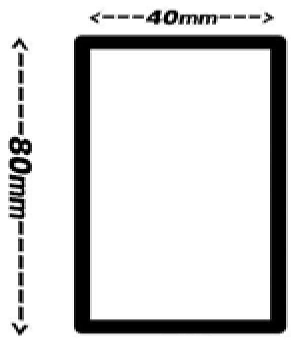
b) $682\times10^4mm^4$

c) $734\times10^4mm^4$

d) $568\times10^4mm^4$

View Answer

Answer : b
Explanation:



Moment of inertia of the rectangular section passing through the base is $bd^3/ 3$.
I = bd/3
$= 40\times(80)^3/ 3$
$= 682.66\times10^4 mm^4$.

10. Mild steel is an example of _______________ mechanical property of the material.

a) Malleability

b) Creep

c) Ductility

d) Elasticity

View Answer

Answer: c
Explanation: Ductility is the property of a material by which material can be drawn into thin wires after undergoing a considerable deformation without rupture. The mild steel, silver, tor steel, aluminium etc. are considered as examples for ductility.

11. Which of the following are the relative properties of the material?

a) Creep

b) Fatigue

c) Hardness

d) Stiffness

View Answer

Answer: c
Explanation: The hardness is the ability of a material to resist indentation (impression), scratching or surface abrasion. It is the relative property of the material. Every material has its own hardness number.

12. Rotating key of a lock is an example of _____________

a) Varignon's Theory

b) Walton's Theory

c) Formation of couple

d) Parallel axis theorem

View Answer

Answer: c
Explanation: A set of two equal and opposite forces whose line of action is different form a couple. The effect of couple is always to produce moment on which it acts either in clockwise or anticlockwise directions. The example is rotating key of a lock.
advertisement

13. The relative change in position is called _______________

a) Matter

b) Body

c) Inertia

d) Motion

View Answer

Answer: d
Explanation: A body said to be in motion when it changes its position with respect to other bodies. The relative change in position is called motion. The motion involves both space and time.

14. Which of the following is not base unit?

a) Area

b) Length

c) Time

d) Temperature

View Answer

Answer: a
Explanation: If the units are expressed in other units which are derived from fundamental units, such units are known as derived units. The examples are area, velocity, acceleration & pressure etc.

15. According to IS 456-2000, the minimum number of longitudinal bars to be provided in rectangular columns is _________

a) 5

b) 4

c) 6

d) 8

View Answer

Answer: b
Explanation: According to IS 456-2000, the cross sectional area of longitudinal reinforcement should not be less than 0.8% and not more than 6% of gross cross-sectional area. The minimum diameter of longitudinal bars is 12 mm and minimum number of longitudinal bars to be provided is 4 for a rectangular column.

Bending Stress Due to Eccentric Loading in Both Directions

1. As per IS 456-2000, the minimum eccentricity for columns shall be given by _________

a) l/500 + D/30

b) l/450 + D/45

c) l/400 + D/40

d) l/250 + D/25

View Answer

Answer: a
Explanation: As per IS 456-2000, clause 25.4 recommends that all columns show the design for the minimum of its eccentricity. No column will be perfectly loaded axially. There might be kind of moment acting due to improper construction.

2. If the columns are effectively held in position and restrained against rotation at both ends. Recommend the value of effective length.

a) 0.6×l

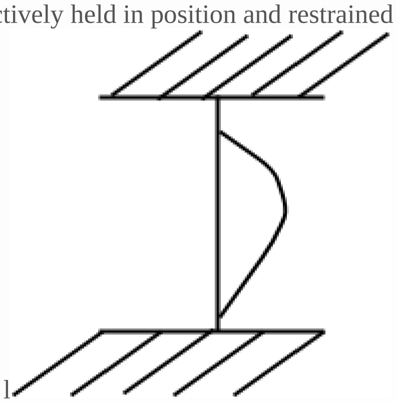
b) 0.65×l

c) 0.77×l

d) 0.9×l

View Answer

Answer: b
Explanation: The effective length of column for various and conditions may be taken from IS 456 2000, for effectively held in position and restrained against rotation in both ends recommended value of effective length is



0.65 l
[l = unsupported length of compression member].

3. A column in which reinforcement is wound spiral is ___________

a) Tied column

b) Spiral column

c) Composite column

d) Short column

View Answer

Answer: b
Explanation: When the main longitudinal bars of the column are enclosed within closely spaced and continuously wound spiral reinforcement, then the column is said to be a spiral column.

4. The inclined members carrying compressive loads are ________

a) Pedestal

b) Strut

c) Post

d) Winch

View Answer

Answer: b
Explanation: The inclined member carries compressive loads in case of frames and trusses are known as Struts. The Pedestal is a vertical compression member whose effective length is less than 3 times its least lateral dimension.

5. Polygonal links are also known as _____________

a) Bent up bars

b) Crancked bars

c) Lateral ties

d) Anchorage bars

View Answer

Answer: c
Explanation: A reinforced concrete member of compression shall have transverse or helical reinforcement. It is either in the form of spiral rings capable of taking up tension or polygonal links (lateral ties) placed closely and confined with main bars.

6. The pitch of the lateral ties shall not be more than the least of the _______________

a) 300mm

b) 450mm

c) 500mm

d) 550mm

View Answer

Answer: a
Explanation: As per IS 456 2000; the which of the ties shall not be more than the least of the
▪ least lateral dimension of the column
▪ sixteen times the diameter of the smallest longitudinal bar
▪ 300 mm.

7. The minimum depth of foundation in all types of soils is __________

a) 350mm

b) 680mm

c) 500mm

d) 280mm

View Answer

Answer: c
Explanation: According to IS 1080 – 1962, the minimum depth of foundation should be not less than 500 mm. However, if good rock is made it smaller depth, only removal of top soil may be sufficient.

8. In T beams, the most of the compressive force is shared by ___________

a) Web

b) Flange

c) Rib

d) Neutral axis

View Answer

Answer: b
Explanation: As the slab being Monolithic with the beam is also compressed and shares the compressive force with the flange, the depth of beam required is less and hence the maximum deflections also less.

9. In T beams, maximum _______ is less.

a) Shear force

b) Bending moment

c) Bending stress

d) Shear stress

View Answer

Answer: b
Explanation: In T beams, the maximum bending moment is less because of the sagging moment is effectively resisted. The maximum deflections are also less in these beams. They are preferred for larger spans when compared to simply supported beams.

10. In continuous beams ______ moment develops at supports.

a) Hogging

b) Sagging

c) Couple

d) Static

View Answer

Answer: a
Explanation: When the slab beam is continuous over several supports, hogging bending moment is induced over the support developing tension at the top surface. The continuous beams and slabs I design for maximum bending moment and shear forces.

11. In continuous beams ______________ moments is always less than support moments.

a) Upward

b) Mid span

c) Downward

d) Sagging

View Answer

Answer: b
Explanation: The mid span moment in continuous beams and slabs is always less than the support moment and hence weight of the beam doesn't affect the stresses induced.

12. Lighter materials of construction can be used for a continuous beam.

a) True

b) False

View Answer

Answer: a
Explanation: Lighter materials are preferred in construction of continuous beam because as the bending moment developed in a continuous beam is less, the bending moment to be resisted is also less.
advertisement

13. ________ is a good example for malleability.

a) Glass

b) Concrete

c) Copper

d) Lead

View Answer

Answer: c
Explanation: Malleability is that property of a material by which it can be beaten or rolled into thin sheets without any rupture. The best example considered for malleability is copper. Other materials include ornamental gold, wrought iron & ornamental silver.

14. Determine the working stress in the factor of safety is 3 and ultimate load is what 127.32N?

a) 46 N/m^2

b) 55 N/m^2

c) 48 N/m^2

d) 42 N/m^2

View Answer

Answer: d
Explanation: We know that working stress is the ratio of ultimate load to factor of safety
Given F.O.S = 3 & W = 127.32N
Working stress = 127.32/3
= 42.44 N/m^2.

15. Volumetric strain = 3× _____________

a) Linear strain

b) Lateral strain

c) Linear stress

d) Lateral stress

View Answer

Answer: a
Explanation: The volumetric strain is the algebraic sum of all the linear or axial strains that are
€v = €xx + €yy + €zz
The volumetric strain will be 3 times the linear strain in any of three axis and €v = 3e
Where (e = linear strain).
Kernel of a Section

1. The approximate percentage of steel taken for lintels in the absence of detailed design is ________

a) 0.6-1%

b) 0.5-0.7%

c) 0.7-1%

d) 0.8-1.2%

View Answer

Answer: c
Explanation: RCC work maybe in foundations, columns, lintels, beams, floor& slabs the estimate is prepared in cubic metres. In absence of detailed design, the percentage of steel reinforcement is taken for lentils 0.7 to 1% and foundation raft footing it is 0.5 to 0.8%.

2. Mix proportion for M20 grade mix is _________

a) 1:3:6

b) 1:1.5:3

c) 1:4:8

d) 1:5:10

View Answer

Answer: b
Explanation: Mix proportion for M20 grade mix is 1:1.5:3.

Grade of concrete	Mix proportionate

M10	1:3:6
M15	1:2:4
M20	1:1.5:3

3. The limit state corresponding to deflection, cracking and vibrations are ________

a) Limit state of collapse

b) Limit state of serviceability

c) Special limit state

d) Limit state of safety

View Answer

Answer: b
Explanation: Limit state of serviceability refers to the ability of the structure at working loads it is the state of limit at which the structure undergoes heavy deflection which affects the finishes casting discomfort to the users.

4. In reinforcing of Steel bars, the end and side covers are taken as _____________ to _____________ mm.

a) 40 to 50mm

b) 30 to 45mm

c) 50 to 75mm

d) 35 to 50mm

View Answer

Answer: a
Explanation: For reinforcement of Steel bars, the end and side covers are taken as 40 to 50 mm and the bottom and top covers 12 to 20 mm for slab and 25 to 50 mm for beams.

5. The field capacity of a soil depends upon ______________ factor.

a) Porosity of soil

b) Soil Tension

c) Saturation capacity

d) Initial regime

View Answer

Answer: a
Explanation: The maximum amount of water content which can be held by soil particles against the force of gravity is called as field capacity. It is the upper limit of the capillary rise of water. It firmly depends on the porosity of soil.

6. According to Fannings formula the flood discharge in cumecs is given by Q = _______________

a) $CA^2/3$

b) $CA^3/4$

c) $CA^5/6$

d) $CA^7/8$

View Answer

Answer: c
Explanation: The emperical formula for flood discharge given by various scientists is
i. Dicken's – $CA^3/4$
ii. Rvye's – $CA^2/3$
iii. Fannings – $CA^5/6$.

7. The estimate of flood can be made by using ____________

a) Arithmetical increase method

b) Geometrical increase method

c) By unit hydrograph method

d) Comparison with graph method

View Answer

Answer: c
Explanation: The estimation of a flood can be made by
i. Flood discharge formula
ii. By physical indication of past flood
iii. By unit hydrograph.

8. In simply supported slabs, alternate bars are curtailed at ________

a) 1/7 of span

b) 1/5 of span

c) 1/3 of span

d) 1/6 of span

View Answer

Answer: d
Explanation: In simply supported beam at least 50% off bus shall extend into the support for a length of 1/3 of development length from the face of the support and the remaining alternate bars are curtailed at one sixth of span.

9. The length of the staircase between two consecutive landings is called _______

a) Tread

b) Flight

c) Rise

d) Effective width

View Answer

Answer: b
Explanation: Stairs provide access for the various floors in a building. The stairs comprises series of steps with landings at appropriate intervals. The stretch between the two landings may be termed as a flight.

10. ________ is used in the entrance of cinema theatres and shopping malls.

a) Open well stair case

b) Dog legged stair case

c) Geometrical stair case

d) Single flight stair case

View Answer

Answer: c
Explanation: It is based on geometrical shape. The staircase is aesthetically superior compared to other types

and generally used in the entrance of cinema theatres and shopping malls. This is mostly adopted in congested areas for good accessibility and proper ventilation.

11. In the design of lintel, determine the base angle of a triangle for poor masonry.

a) 40°

b) 45°

c) 60°

d) 90°

View Answer

Answer: c
Explanation: It is assumed that the load of triangle portion of the masonry is considered to act on the lintel. The base angle of the triangle depends upon the quality of brick masonry used. It may be taken as 45°for good masonry and 60° for poor masonry.

12. Calculate the height of the equilateral triangle in the design of lintel, if the masonry used is poor graded.

Take effective span as 1.29 m.

a) 1.334m

b) 1.433m

c) 1.117m

d) 1.125m

View Answer

Answer: c
Explanation: Taking 60° [As masonry is of poor quality] Then height of equilateral triangle (h) = l × sin 60 °
= 1.29 × sin 60 °
= 1.117m.
advertisement

13. For a simply supported beam, the basic l/d ratio should be ____________

a) 20

b) 22

c) 16

d) 30

View Answer

Answer: a
Explanation: If the beam is being checked for deflection criteria, the basic values of l/d ratio of various beams should be
1. For Simply supported beam – 20
2. for cantilever beam – 7
3. for continuous beam – 26.

14. A beam of clear span 6 metres is supported on bearings of 150 mm if the effective depth of a beam is 400 mm. calculate the effective span.

a) 6.4m

b) 6.15m

c) 6.0m

d) 6.3m

View Answer

Answer: b
Explanation: For calculation of effective span, the least of below values should be adopted:
1. Clear span + d = 6 + 0.4 = 6.4m
2. Clear span + bearings/2 + bearings/2 = 6+0.15/2+0.15/2 = 6.15m
The least of the above values is 6.15 metres. Hence effective span is 6.15 m.

15. The final deflection of horizontal members will be the level of casting should not exceed _____________

a) Span/500

b) Span/250

c) Span/300

d) Span/350

View Answer

Answer: b
Explanation: The serviceability requirement for deflection should be such that final deflection of horizontal members below the level of casting should not exceed span / 250. This is the reason that the user can't notice the deflection. The deflection taking place after construction of partitions should not exceed span / 350 or 20 mm whichever is less.
Dams

1. The obstruction or a barrier built across the stream or river is called _____________

a) Barrage

b) Weir

c) Dam

d) Reservoir

View Answer

Answer: c
Explanation: A dam may be defined as an obstruction or a barrier built across the stream or river these are artificial storage works. It retains water to create an impounding reservoir.

2. FTL Stands for ________

a) Free tank level

b) Full tank level

c) Full top level

d) Fill toe level

View Answer

Answer: b
Explanation: It is also called a full reservoir level (FRL). It is a level up to which the water stored obviously the crest of the spillway is fixed at this level.

3. _______ is openings extending from upstream to downstream of the dam.

a) Guide banks

b) Divide voids

c) Sluices

d) Spillway

View Answer

Answer: c
Explanation: Sluices are openings or conduits extending from upstream face of the dam to downstream face of the dam. They are used to clean the silt from the reservoir. They also decrease the peak flood in the reservoir.

4. Water stored in dam is expressed in ________

a) Mega cumec metres

b) Million cubic metres

c) Metric cumec

d) Million cusec metres

View Answer

Answer: b
Explanation: It is the total quantity of water stored up to FRL. It includes dead storage also. It is expressed generally in thousand hectare metre or million cubic metres (Mm^3).

5. MDDL Stands for _________

a) Minimum draw down level

b) Maximum draw down level

c) Million drop down level

d) Mega drop down level

View Answer

Answer: a
Explanation: It is the lowest level up to which the reservoir is depleted from the considerations of hydropower generation. So this level is known as minimum draw down level (MDDL).

6. ______ dam which resists are the external forces by virtue of its self weight.

a) Earthen dam

b) Storage dam

c) Detention dam

d) Gravity dam

View Answer

Answer: d
Explanation: A gravity dam is that, which is stable against all the external forces achieved by the weight of the dam itself. This is the most permanent one and hence it is very commonly used. It may be constructed in all localities.

7. The factor of safety against overturning should not be less than ______

a) 1.8

b) 2.25

c) 1.5

d) 1.75

View Answer

Answer: c
Explanation: In the dam section, the overturning takes place when a resultant force cuts the base of the dam downstream of the toe. The factor of safety against overturning is the ratio of the stabilizing moment to the overturning moments. The safety against overturning should not be less than 1.5.

8. In sliding failure, the co-efficient of friction varies from _________

a) 0.65 – 0.75

b) 0.8 – 0.9

c) 0.45 – 0.65

d) 0.85 – 1

View Answer

Answer: a
Explanation: To avoid sliding, the factor of safety against the sliding should be greater than 1.
F.S = M(V-U) / €H > 1
Where M = Co-efficient of friction. It varies from 0.65 to 0.75
V = Total vertical force
U = Upward force.

9. Which of the following forces do not act on the dam?

a) Silt pressure

b) Wave pressure

c) Creep pressure

d) Uplift

View Answer

Answer: c
Explanation: Among the above forces, creep pressure does not act on the dam. Generally on gravity dam number of forces such as water pressure, wave pressure, wind pressure, ice pressure etc. will be acting in a horizontal direction. In the same way, uplift, self weight acts in vertical direction.

10. The elementary profile of a dam is generally a ________

a) Isosceles triangle

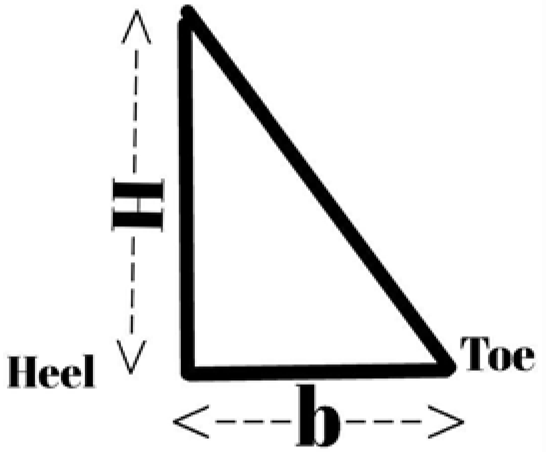
b) Right angled triangle

c) Scalene triangle

d) Equilateral triangle

View Answer

Answer: b
Explanation: In the absence of any other forces, the forces due to water and self weight of the dam form an elementary profile which will be in triangular section having zero top width at water level, where the pressure is zero and maximum base width is at bottom where the maximum water pressure acts.



11. _____ acts as an inspection chamber in Dams.

a) Spillway

b) Heel

c) Drainage gallery

d) Toe

View Answer

Answer: c
Explanation: A drainage gallery is an opening in the body of a dam which runs longitudinally. It runs through the length of the dam. Generally, it is a rectangle shape with flat a semi-circular head usually 1.5 m wide and 2.5m height.

12. The minimum standard height for a construction joint is about ________

a) 1.2 m

b) 1.5 m

c) 2.1 m

d) 2.3 m

View Answer

Answer: b
Explanation: The joints which facilitate construction of the dam to proceed in small lifts. These joints are also known as horizontal joints. A lift may be defined as the vertical distance between two consecutive construction joints. The height is about 1.5 m each.
advertisement

13. Cracks developed in the body of dam section can be avoided by ________

a) Construction joints

b) Contraction joints

c) Transverse joints

d) Longitudinal joints

View Answer

Answer: b
Explanation: Due to variation in temperature it causes contraction and expansion in masonry or concrete of the dam. It will develop fine cracks in the body of the dam. By providing contraction joints, these cracks can be avoided.

14. ______ is the over flow section or portion of the dam.

a) Heel

b) Toe

c) Spillway

d) Gallery

View Answer

Answer: c
Explanation: A spillway is the overflow section or portion of the dam over which surplus discharge flows from reservoir to downstream face. This structure is provided in the body of the dam or near the dam or on the periphery of the reservoir.

15. _______ is the common type of spillway used in gravity dams.

a) Ogee spillway

b) Trough spillway

c) Side channel spillway

d) Emergency spillway

View Answer

Answer: a
Explanation: An ogee spillway is very common type of spillway used in gravity dams. It consists of two parts namely ¡)ogee crest and ¡¡) a bucket. In this spillway water spills and flows over and ogee crest in the form of a rolling sheet of water. Due to this, the development of negative pressures can be avoided.
Rectangular Dam

1. Which of the following is not a failure of a rectangular dam?

a) Overturning

b) Toe erosion

c) Sliding

d) Foundation failure

View Answer

Answer: b
Explanation: Among the above failures, the toe erosion is not related to rectangular dams. Toe erosion is caused due to in some cases the spillway is constructed very near to the dam section inside circumstances the discharge water may erode the dam.

2. Structural failures contribute about _______________ in the failure of dam.

a) 45%

b) 60%

c) 30%

d) 20%

View Answer

Answer: c
Explanation: About 30% of failures are due to:
i. Foundation slide
ii. Upstream slope failure
iii. Downstream slope failure
iv. Failure due to flow slide.

3. The free board is provided in dams to avoid _______________

a) Piping

b) Foundation of upstream

c) Wave erosion

d) Overtopping

View Answer

Answer: d
Explanation: By providing sufficient free board and by providing an adequate capacity of the spillway, failure due to overtopping of the damn can be avoided.

4. By providing ______________ gully formation can be avoided.

a) Berms

b) Aqueduct

c) Spillway

d) Free board

View Answer

Answer: a
Explanation: By providing berms and turning on the downstream face of the dam, the failure due to the formation of the gullies can be avoided.

5. The maintenance of the reservoirs, above _____________ Ha comes under irrigation department.

a) 30

b) 40

c) 50

d) 60

View Answer

Answer: b
Explanation: The maintenance of reservoirs is having commendable area below 40Ha comes under Panchayat Raj department and above 40 Ha come under irrigation department.

6. Which of the following process will you prefer to prevent the leakage of water in the dam foundation?

a) Guniting

b) Grouting

c) Gam mixing

d) Filling

View Answer

Answer: b
Explanation: Grouting is a process in which a grout in liquid (8:1) slurry form, is injected into the soil under suitable pressures and applied through the pipes.

7. ______ grouting increases the bearing capacity of soil.

a) Curtain

b) Consolidated

c) Blanket

d) Descending stage grouting

View Answer

Answer: b
Explanation: According to functions served, the groutings can be classified into
i. Consolidated grouting
ii. Curtain grouting
iii. Area grouting
Consolidation grouting increases the bearing capacity of the soil and creates proper bonding between separated bodies.

8. According to IS, the specific gravity of a good building stone used in heavy dams should be ______

a) 2.2 – 2.4

b) 2.3 – 2.5

c) 2.4 – 2.8

d) 2.6 – 3

View Answer

Answer: c
Explanation: The stones used for heavy irrigation works such as dams, bridges, check dams, weirs, docks should have specific gravity between 2.4 to 2.8. Stones used for the roof may have less specific gravity.

9. Hardness can be measured using _______

a) Mohr's scale

b) Silica scale

c) Dalton's scale

d) Abrasion factor

View Answer

Answer: a
Explanation: The property to resist the abrasive forces cause due to wear & tear and friction is called hardness. It is determined by the Mohr's scale of hardness in a laboratory. A hard stone will not show any scratches.

10. Granite has been widely used for dams construction because of _______

a) Crushing strength

b) Cost

c) Workability

d) Porosity

View Answer

Answer: a
Explanation: Granite stone is derived from igneous rocks. It is very hard, durable and strong. Its crushing strength is 100 to 140 N/mm^2. For this property, it is widely used in all important works.

11. The range of slenderness ratio in dams varies from ________

a) 13 – 15

b) 12 – 15

c) 15 – 18

d) 15 – 20

View Answer

Answer: b
Explanation: In dams, the slenderness ratio can be calculated through
= Height of buttress / Thickness of buttress
• It varies from 12 to 15.

12. _______ is provided for installation of control equipment of valves in dams.

a) Vertical shafts

b) Hydraulic openings

c) Connecting passages

d) Isolated chambers

View Answer

Answer: d
Explanation: Isolated chambers are provided for installation of control equipment of walls or pipeline or pumps. The function is to supply water to irrigation canals, fulfilling commitments and desilting the reservoir.

advertisement

13. The ratio of the volume of voids to the volume of given soil mass is ___________

a) Porosity

b) Void ratio

c) Dry density

d) Specific gravity

View Answer

Answer: a
Explanation: The porosity of a given soil sample is the ratio of the volume of voids to the value of given soil mass. It is denoted by “n”.
n = Vu / V.

14. Sand layer is an example of _______________

a) Aquiclude

b) Aquifuge

c) Aquitard

d) Aquifer

View Answer

Answer: d
Explanation: An aquifer is a geologic formation (or) saturated bed which contains water and yields them significantly. Example: sand bed. They permit the appreciable quantity of water under ordinary field conditions.

15. _________ keeps the phreatic line within the dam section.

a) Longitudinal filter

b) Cross filter

c) Rock toe

d) Toe drain

View Answer

Answer: c
Explanation: Rock toe keeps the phreatic line within the damn section and also facilitates drainage. It is nothing but a downstream portion of a dam made of graded material. To achieve good results, the height of rock toe shall be kept 1/3 to 1/ 4 of dam height.
Rectangular Dam Analysis

1. Calculate the self-weight of the masonry of the rectangle dam of 10 m height and 4 m wide. Consider specific weight of masonry as 20kN/m^3.

a) 600 kN

b) 500 kN

c) 800 kN

d) 1000 kN

View Answer

Answer: c
Explanation: Self weight of masonry = W = Area of cross-section × 1× Specific weight of masonry.
= (10×4)×1×20 = 800 kN.

2. Water-cement ratio varies normally from _______________ to ___________

a) 0.42 – 0.45

b) 0.45 – 0.48

c) 0.42 – 0.48

d) 0.45 – 0.5

View Answer

Answer: c
Explanation: The ratio to which the required amount of water is added to weight of cement to obtain desired consistency and workability of concrete mix is known as water cement ratio. It varies from 0.42 to 0.48.

3. Calculate the resultant force of dam with given self weight 800kN and water pressure be 500kN.

a) 943.4 kN

b) 956.7 kN

c) 948.6 kN

d) 939.1 KN

View Answer

Answer: a
Explanation: Resultant force (R) = $(P^2 + W^2)^{1/2} = 500^2 + 800^2$.
$= (500^2 + 800^2)^{1/2}$
= 943.39 ~ 943.4 kN.

4. When the reservoir is empty tension occurs at ____________

a) Toe

b) Heel

c) Top width

d) Bottom width

View Answer

Answer: a
Explanation: For no tension to develop in the damn section in any condition, the eccentricity should be less than b/6. When the reservoir is empty, tension occurs at toe and compression occurs at heel.

5. What is the mix proportion for M15 grade concrete?

a) 1:1:2

b) 1:2:4

c) 1:3:6

d) 1:4:8

View Answer

Answer: b
Explanation: Mix proportion for M15 grade concrete is 1:2:4.

Grade of concrete	Mix proportionate
M10	1:3:6

M15	1:2:4
M20	1:1.5:3

6. Laterite is an example of ____________ rock.

a) Siliceous

b) Argillaceous

c) Calcareous

d) Metamorphic

View Answer

Answer: b
Explanation: The Rocks having (Gneiss) aluminium or clay as the main component, such rocks are known as argillaceous rocks. Example: Slate, Laterite.

7. _________ is crystalline and compact in structure.

a) Marbles

b) Granite

c) Kadapa slabs

d) Shahabad stones

View Answer

Answer: a
Explanation: Marble is a metamorphic rock and is made from limestone, this is a very costly stone. It is less durable. It is crystalline and compact in structure. So it can take a fine polish. It is not very hard.

8. As per IS, the standard dimensions for a brick is ________ (in cm).

a) 19×8×8

b) 19×9×8

c) 19×9×9

d) 19×8×9

View Answer

Answer: c
Explanation: The shape of a brick should be uniform with rectangular surface and its size should be standard with 19×9×9 cm. They should have a uniform red colour and it should be well burnt.

9. Formation of white patches on the surface on the bricks is _____________

a) Tempering

b) Porosity

c) Shrinkage

d) Efflorescence

View Answer

Answer: d
Explanation: A good brick should not contain excess alkaline soils when the bricks are exposed to the atmosphere. It should not absorb moisture. If it attracts moisture then dampness occurs and results in the formation of white patches. Hence the brick begins decaying.

10. Kiln burning involves 90% of first class bricks.

a) True

b) False

View Answer

Answer: a
Explanation: Kiln burning is a permanent structure. There is complete control on fire. It produces a large scale of manufactured bricks, it takes only 24 hours in burning the bricks and 12 days for cooling. It produces 90% of burnt bricks.

11. ______ bricks can withstand up to a temperature of 1800°C.

a) Refractory

b) Fly ash

c) Clay

d) Cement

View Answer

Answer: a
Explanation: The bricks made from refractory clay are called refractory bricks. The weight of these bricks is 2 kN/m^3. The standard size is 230× 65× 113 mm. These bricks can withstand up to the temperature of 1800°C.

12. According to IS, the minimum expansion joint in construction should be ________

a) 18mm to 30 mm

b) 15mm to 24mm

c) 18mm to 25mm

d) 22mm to 30mm

View Answer

Answer: c
Explanation: According to Indian standards 456- 2000, it is desirable to provide 18 mm to 25 mm thick expansion joints after every 30 to 45 m construction of length.
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13. The edges formed by the intersection of plane surfaces of a brick are known as _________

a) Arises

b) Stretcher

c) Header

d) Frog

View Answer

Answer: a
Explanation: In any bond, the edges formed by the intersection of plane surfaces of a brick are termed as arises. These are straight and sharp in case of good bricks or brick tiles.

14. The depression made in the face of brick during its manufacture is _________

a) Brick tile

b) Bat

c) Frog

d) Quoin closer

View Answer

Answer: c
Explanation: The depression provided on any face of the brick during its manufacture can be termed as frog. A hand moulded bricks has one frog. A pressed brick has two frogs.

15. Calculate the eccentricity of a rectangular dam of width 4 m. Take the distance between the water face and point where resultant cuts the base as 5.25 m.

a) 2.25m

b) 3.25m

c) 4.35m

d) 5.35m

View Answer

Answer: b
Explanation: Eccentricity = e = Z – b/ 2
Where Z = 5.25 m & b = 4m ; Now, e = Z- b/2
e = 5.25 – 4/2
= 3.25m.

Trapezoidal Dam as Vertical Side Phase

1. Calculate the horizontal water pressure acting on a dam. The total depth of water be 13m. Take specific weight of water be $10kN/m^3$.

a) 765 kN

b) 845 kN

c) 965 kN

d) 1175 kN

View Answer

Answer: b
Explanation: Horizontal water pressure(P) = $w\times h^2/ 2$.
Where w = 10 kN/m^3. h= 13m.
P = $10\times 13^2/ 2$ = 845kN.

2. Calculate the self-weight of a rectangular dam of 22m high and 8m wide. It contains water upto a height of 20m. Consider the specific weight of masonry be 25 kN/m^3.

a) 3560 kN

b) 5432 kN

c) 4400 kN

d) 5680 kN

View Answer

Answer: c
Explanation: Consider 1m length of the dam. The total depth of dam is 22 metres.
Self weight of masonry (W)= $(22\times 8)\times 1\times 25$
= 4400kN.

3. The pressure intensity of water at free surface is ________

a) Zero

b) Maximum

c) Minimum

d) Uniform

View Answer

Answer: a
Explanation: The pressure intensity of water at a free surface is always zero and increase linearly to a maximum at the base and is equal to “ wh”.

4. Self weight of dam acts in ___________ direction.

a) Vertical

b) Horizontal

c) Inclined

d) Parallel

View Answer

Answer: a
Explanation: Self weight of the Dam at vertically downwards passing through centre of gravity of the damn section and Total horizontal water pressure acts horizontally at heel of the dam.

5. The maximum compressive stresses developed at the base of the dam should not exceed permissible ___________ stresses for masonry.

a) Tensile

b) Crippling

c) Compressive

d) Shear

View Answer

Answer: c
Explanation: To avoid the failure of crushing, the maximum compressive stress developed at the base of the dam should not exceed the permissible compressive stress for masonry with which the dam is constructed.

6. For no _______ to develop in the dam section the resultant should always lie within the middle third.

a) Compression

b) Tension

c) Shear

d) Buckling

View Answer

Answer: b
Explanation: For no tension to develop in the dam section at any condition, the eccentricity developed with the resultant should be always less than b/6. The resultant must always lie within the middle third.

7. Calculate the self weight of trapezoidal dam with top width 5m and bottom width 8m. The height of dam is 15 m. Consider specific weight of masonry be 25kN/m^3.

a) 3456.5 kN

b) 2768.5 kN

c) 2437.5 kN

d) 3450 kN

View Answer

Answer: c
Explanation: Consider 1m of length, area of trapezoidal dam be (a+b)/2 ×H
The self weight of trapezoidal dam (W) = (a+b)/2 × H × 1 × 25
W = 2437.5 kN.

8. The material(earth) retained by the retaining wall is called as ___________

a) Surcharge

b) Turf

c) Foliate

d) Back fill

View Answer

Answer: d
Explanation: The material retained by the retaining wall is called back fill. The top surface of the back fills maybe him the horizontal or inclined.

9. The inclination of surcharge to the horizontal is called _____________

a) Surcharge elevation

b) Surcharge angle

c) Surcharge factor

d) Surcharge depression

View Answer

Answer: b
Explanation: The back fill lying above a horizontal plane at an elevation of the top of wall is known as a surcharge and its inclination to the horizontal is called surcharge angle.

10. Which of the following is practical pressure?

a) Active earth pressure

b) Passive earth pressure

c) Soil moisture tension

d) Horizontal water pressure

View Answer

Answer: a
Explanation: The pressure exerted by back fill on retaining wall is called an active earth pressure. This is the minimum earth pressure exerted by the soil. This is also known as practical pressure.

11. The angle of internal friction for water is ___________

a) 180°

b) 100°

c) 0°

d) 270°

View Answer

Answer: c
Explanation: Angle of internal friction is defined as the maximum slope at which the particles of soil will come in rest due to their internal friction. It is also called an angle of repose for water it is 0°.

12. Which of the following is theoretical pressure?

a) Active earth pressure

b) Passive earth pressure

c) Soil Tension

d) Horizontal water pressure

View Answer

Answer: b
Explanation: The pressure exerted by the retaining wall on the retained earth is called passive earth pressure. This is a maximum earth pressure due to maximum shear stress on the retaining wall. This is also known as theoretical pressure.
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13. Which of the following is an example for plasticizer?

a) Ca

b) Mg

c) Zn

d) Hg

View Answer

Answer: a
Explanation: The combination of both inorganic and organic materials which will help to reduce the water content for getting higher workability are known as plasticizers. Examples are calcium, sodium, salts of hydrocarbons etc.

14. _______ curing is adopted for columns and walls.

a) Moist curing

b) Membrane curing

c) Ponding

d) Descending stage

View Answer

Answer: a
Explanation: In this curing, the exposed surface of the concrete is kept in a damp and moist condition for a long time, the vertical members like columns and walls can be adopted for this type of curing.

15. Prestressed concrete is an example of _____________

a) Malleability

b) Ductility

c) Fatigue

d) Plasticity

View Answer

Answer: c
Explanation: Fatigue is the property of a material by which the material with stands to repeating, reversing or varying upcoming loads. The best example of fatigue is concrete and prestressed concrete.
Trapezoidal Dam as Inclined Side Phase

1. Calculate the eccentricity of a trapezoidal dam with a distance between the centre of gravity and point where the resultant cuts the base is 5m. The bottom width of the dam is 3m.

a) 2.5m

b) 3.5m

c) 4.5m

d) 5m

View Answer

Answer: b
Explanation: The eccentricity (e) = Z – b/2.
Z= distance between the centre of gravity and point where the resultant cuts the base is 5m.
= 5-3/2 = 1.5m.

2. Which of the following is not a failure of retaining wall?

a) Structural slide

b) Shear sliding

c) Crushing

d) Slope pitching

View Answer

Answer: c
Explanation: Crushing Failure is related to dams. The retaining walls are the structures constructed to store earth on one side especially in case of hill or ghat roads.

3. _________ pressure which occurs commonly in dams.

a) Passive earth pressure

b) Active earth pressure

c) Soil moisture tension

d) Wind pressure

View Answer

Answer: b
Explanation: Active earth pressure is exerted by backfill on retaining walls. It is also called as practical pressure. It occurs commonly in dams.

4. __________ failures contribute 40% to earthen dams.

a) Seepage

b) Structural

c) Hydraulic

d) Natural

View Answer

Answer: c
Explanation: On the basis of various investigation reports and case studies, hydraulic failures contribute about 40% of failures to earthen dams. The rest of the failures is shared by seepage failures and structural failures.

5. Which of the following filters are also known as chimney drains?

a) Horizontal filter

b) Inclined filter

c) Rock toe

d) Toe drain

View Answer

Answer: b
Explanation: The filters which are laid across the outer slope of the impervious core are called as inclined filters. They are also known as Chimney drains. They are provided mainly to collect the seepage emerging out of the core.

6. Zoned earthen dams are also known as ______

a) Heterogeneous dams

b) Core wall dams

c) Homogeneous dams

d) Hydraulic dam

View Answer

Answer: a
Explanation: The dams are constructed on shallow pervious foundations in this dam section about outer zones are made fairly pervious material and the inner most zoning called "hearting" is done was fairly impervious material. It is also known as heterogeneous dam.

7. ___________ dams are built with key trenches.

a) Heterogeneous earth dam

b) Homogeneous earth dam

c) Earth Dam with Core wall

d) Rolled fill dam

View Answer

Answer: c
Explanation: The outer zones of this dam are made of pervious material as in zoned dam. In this case, it is essentially build cut-off wall (cut-off trench) built quite deep preferably upto impervious rock layer in the foundation.

8. Line of seepage is also known as __________

a) Hydraulic gradient

b) Phreatic line

c) Seepage gradient

d) Hydraulic seepage line

View Answer

Answer: b
Explanation: The line within the dam section below which there are positive hydrostatic pressures in a dam and above the line the hydrostatic pressures are negative. It gives a divide line between dry and saturated soils.

9. ____________ represents the top stream line.

a) Phreatic line

b) Hydraulic gradient line

c) Seepage gradient

d) Hydraulic seepage line

View Answer

Answer: a
Explanation: Phreatic line is also called a line of seepage or saturation line. The phreatic line represents the top streamline and hence helps us in drawing the flow net.

10. The hydrostatic pressures on phreatic line are equal to_____

a) Zero

b) Maximum

c) Minimum

d) Constant

View Answer

Answer: a
Explanation: The hydrostatic pressure on phreatic line is equal to atmospheric pressure and hence equal to zero, the flow through the body of the dam below the phreatic line reduces the effective weight of the soil and thus reduces the shear strength of the soil.

11. Expand MWL?

a) Minimum water level

b) Maximum water level

c) Meagre water level

d) Most wind level

View Answer

Answer: b
Explanation: The water level that is attained during floods is called the maximum water level. The dams and spillway sections are designed to withstand water pressure at this level.

12. _______ is the difference of Level between full reservoir level and top of the dam.

a) Net free board

b) Gross free board

c) Design free board

d) Over free board

View Answer

Answer: b
Explanation: In dams, in order to prevent the overtopping during peak floods, a sufficient margin is provided between the full reservoir level and top of the dam. This is known as gross free board.
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13. By keeping the phreatic line within the downstream toe, the ____________ can be avoided.

a) Piping

b) Gullying

c) Sloughing

d) Over topping

View Answer

Answer: c
Explanation: If the filter at downstream side toe is choked then also the downstream too becomes saturated. In such circumstances, some erosion occurs in downstream to this causes sloughing. To avoid this phreatic line must be within the downstream toe.

14. Springs(closely coiled) are examples of ______________

a) stiffness

b) hardness

c) toughness

d) creep

View Answer

Answer: a
Explanation: The property of a material or substance which offers resistance to bending action and measures the load required to be applied is called stiffness. It is denoted by s or k. Springs are the best examples of stiffness.

15. Perennial canals are also known as _________

a) Inundation canal

b) Productive canal

c) Feeder canal

d) Permanent canal

View Answer

Answer: d
Explanation: The canal which is fed by a permanent source of supply is said to be a permanent Canal. It has also regulatory works. This canal is also sometimes known as a perennial canal.
Dams Stability Analysis

1. To ensure economy in dam sections, the _______ should be minimum.

a) Base width

b) Top width

c) Spillway length

d) Toe of the wall

View Answer

Answer: a
Explanation: In dams, the economy prevails if the cross section of a dam is provided with minimum base width. Base width "b" can be determined from the equation: b2 +ab+ a2 = H2/ S.

2. Calculate the maximum stress at the base section is the self weight is 4400 kN. The top and bottom width of them are 3 and 8 m respectively. Take (e) = 2.97.

a) 1658.15 kN/m^2

b) 1775.12 kN/m^2

c) 1897.45 kN/m^2

d) 2336.67 kN/m^2

View Answer

Answer: b
Explanation: The maximum stress at the base section = W/b (1+6e/b)
P= 4400/8 (1+6×2.97/8)
= 1775.125 kN/m^2.

3. If the maximum stress is positive, then the nature of stress is _____

a) Tensile

b) Shearing

c) Compressive

d) Bending

View Answer

Answer: c
Explanation: If the stress developed in the dam section at the base is positive there it indicates the nature of stress to be compressive.

4. Determine the eccentricity of the dam section, if the base width of the dam be 6m. Take Z = 5.5m.

a) 2.5

b) 1.5

c) 3.5

d) 4.5

View Answer

Answer: a
Explanation: e = Z – b/2. [The value of Z = 5.5m] = 5.5 – 6/2
= 5.5 – 3
= 2.5 m.

5. Calculate the minimum stress developed at the heel of the dam, if the self weight of the dam is 924 kN and the base with is 6 metres [Take e = 0.0945m].

a) 145 kN/m^2

b) 139 kN/m^2

c) 167 kN/m^2

d) 183 kN/m^2

View Answer

Answer: b
Explanation: The minimum stress developed at the heel of the dam is W/b ×(1-6e/b).
= 920/6 ×(1-6×0.0945/6).
= 139 kN/m^2.

6. The side slopes depend on _____________ conditions of a proposed dam.

a) Toe width

b) Height of foundation

c) Character of material

d) Free board allowance

View Answer

Answer: c
Explanation: The upstream and downstream slopes of the Dam should be stable in all situations the side slopes depend upon
1.Height of the dam
2.Character of material
3.Nature of foundation.

7. Molitor’s formula can be used for calculation of ____________

a) Freeboard

b) Toe width

c) Wave height

d) Base drop

View Answer

Answer: c
Explanation: The minimum height of the free board for wave action is generally taken to be equal to 1.5 hw. Where hw = height of wave action.
It can be calculated using $0.032(VF)^{1/2}$.

8. The height of the dam = free board + ___________

a) FTL

b) MWL

c) FRL

d) HFL

View Answer

Answer: d
Explanation: The dam's height mainly depends on HFL of the reservoir. The height of the dam above surface is given by the HFL plus the free board.
Height of the dam = HFL + free board.

9. _____________ sections allow the surplus discharge to flow in dams.

a) Mulching

b) Over reinforced

c) Breaching

d) Balanced

View Answer

Answer: c
Explanation: Sometimes during construction, the surplus works are avoided in many tanks. In such circumstances, breaching sections are provided in the dams to allow the surplus flood discharge. With this the scouring of section can be avoided.

10. If the minimum stress developed is negative, then the nature of stress is ___________

a) Shearing

b) Tensile

c) Bending

d) Compressive

View Answer

Answer: b
Explanation: If the minimum stress developed at the base of the dam section is negative, then the respective nature of the stress will be in tensile condition.

11. ____________ creates concentrated seepage in dams section.

a) Longitudinal cracks

b) Transverse cracks

c) Construction cracks

d) Contraction cracks

View Answer

Answer: b
Explanation: Due to differential settlement cracks may be developed in the bund. These are of two types 1) longitudinal cracks 2) transverse cracks. The transverse cracks are more dangerous to the dam section because they can create concentrated seepage.

12. The upstream slope recommended for sand and gravel with RCC core wall is __________

a) 1:2

b) 3:1

c) 2.5:1

d) 1.5:1

View Answer

Answer: c
Explanation: According to Terazghi, the following upstream slopes should be recommended.
For:
1. Homogeneous well graded – 2.5 : 1
2. Homogeneous coarse silt – 3 : 1
3. Sand and gravel with RCC core wall – 2.5 : 1.
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13. Major distributaries discharge varies from ____________

a) 0.25 to 5 cumecs

b) 2 to 4 cumecs

c) 1.5 to 5 cumecs

d) 1.2 to 5 cumecs

View Answer

Answer: a
Explanation: The major distributary takes off from a branch canal to distribute the water to various parts of the field. The supply of the water varies from 0.25 to 5 cumecs.

14. Field channels are also known as ______

a) Branch canals

b) Slope channels

c) Water courses

d) Contour canals

View Answer

Answer: c
Explanation: The water courses are the channel that carries irrigation water to the fields. The water courses derive their supply from distributaries through outlets. They are also called as field channels.

15. The structures constructed along are distributaries are called as _______

a) Inlets

b) Outlets

c) Distributaries

d) Channels

View Answer

Answer: b
Explanation: An outlet is a simple and small irrigation structure which is constructed along the distributaries.

The amount of water that is withdrawn through the outlet is in proportion to the area that is irrigated below respective point.

Slope

1. Slope in the beam at any point is measured in ____________

a) Degrees

b) Minutes

c) Radians

d) Metric tonnes

View Answer

Answer: c
Explanation: The slope is defined as at any point on the bent beam is the angle measured in terms of radians to which the tangent at that point makes with the x axis.

2. Elastic curve is also known as __________

a) Refraction curve

b) Reflection curve

c) Deflection curve

d) Random curve

View Answer

Answer: c
Explanation: An elastic curve is defined as the line to which the longitudinal axis of a beam deviates under given load. It is also called a deflection curve.

3. Which of the following method is not used for determining slope and deflection at a point?

a) Moment area method

b) Double integration method

c) Isoheytal method

d) Macaulay's method

View Answer

Answer: c
Explanation: The method "Isoheytal" can be used for calculating run-off over an area. The remaining methods are effectively adopted to calculate the slope and deflection at a point in any type of beam.

4. The slope is denoted by _______

a) k

b) y

c) i

d) c

View Answer

Answer: c
Explanation: The slope at any section in a deflection beam is defined as the angle measured in radians to the tangent at the section makes with the original axis of the beam.
•It is denoted by "i".

5. Calculate the slope at supports, if the area is 180kNm^2. Take flexural rigidity as 50000.

a) 0.0054 radians

b) 0.0072 radians

c) 0.0036 radians

d) 0.108 radians

View Answer

Answer: c
Explanation: Maximum slope at supports be i = A/EI
= 180/50000
i = 0.0036 radians.

6. In cantilever beams, the slope is ______________ at fixed end.

a) Maximum

b) Zero

c) Minimum

d) Uniform

View Answer

Answer: b
Explanation: The slope in cantilever beam is zero at the fixed end of the cantilever and the slope is maximum at it's free end. The slope is determined in the moment area method through Mohr's theorems.

7. Slope is maximum at _______ in simply supported beams.

a) Mid span

b) Through out

c) Supports

d) At point of loading

View Answer

Answer: a
Explanation: In case simply supported beams, the slope is maximum at the end supports of the beam and relatively zero at midspan of a symmetrically loaded beam.

8. Mohr's theorem- 1 states ________

a) E/AI

b) I/EA

c) A/EI

d) A=EI

View Answer

Answer: c
Explanation: According to Mohr's theorem-1, the change of slope between any of the two points on and Elastic axis is equal to the net area of bending moment diagram (A) between these two points divided by flexural rigidity(EI).

9. Using Mohr's theorem, calculate the maximum slope of a cantilever beam if the bending moment area diagram is 90kNm^2. Take EI = 4000 kNm^2.

a) 0.0225 radians

b) 0 0367 radians

c) 0.0455 radians

d) 0.066 radians

View Answer

Answer: a
Explanation: The maximum slope at free support (in cantilever beam) = i = A/EI
= 90/4000
= 0.0225 radians.

10. Contour canals are also called as _______

a) Single bank canal

b) Ridge canal

c) Side slope canal

d) Watershed canal

View Answer

Answer: a
Explanation: In this method, the canal is aligned along the falling contour. A generally higher side is left without bank. So it is also called a single bank canal. The contour canal cuts across the natural drainage courses.

11. _______________ provides employment to the cultivators at the time of famine.

a) Productive canal

b) Link canal

c) Protective canal

d) Inundation canal

View Answer

Answer: c
Explanation: The construction of protective canals and their development may be started during summer in hence they provide employment to the farmers at the time of drought and famine. Protective canals are not remunerative as productive canals.

12. _______________ bricks are used in the lining of blast furnaces.

a) Magnesia

b) Dolomite

c) Bauxite

d) Fly ash

View Answer

Answer: b
Explanation: Dolomite bricks are made especially from dolomite it contains nearly 30% lime and 22% of magnesium these bricks are inferior to magnesite bricks. They are generally used in the lining of blast furnaces.
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13. ______________ bricks are resistant to corrosion.

a) silica bricks

b) magnesia bricks

c) bauxite bricks

d) fire bricks

View Answer

Answer: c
Explanation: Bauxite bricks contain nearly 75% of aluminium and it is mixed with fire clay 15 to 30% and added some water to mould. High alumina bricks are resistant to corrosion.

14. _____________ bricks are used in the lining of electric furnace.

a) Frosterite

b) Spinel

c) Chrome

d) Basic

View Answer

Answer: b
Explanation: The spinal bricks belong to neutral bricks. The spinel bricks mainly consist of alumina and magnesia. These bricks are widely used in the lining of electric furnace.

15. The finished product after burning magnesite is named as ___________

a) Perillax

b) Hellyx

c) Pyrolytaex

d) Syrilax

View Answer

Answer: a
Explanation: The heating of magnesia bricks is continued in the same kiln after reaching the temperature of 1950°C, and then some amount of iron oxide is mixed. The finished product after burning magnesite is named as perillax.
Deflection

1. Units of deflection are _________

a) kNm

b) kN/m

c) kN

d) m

View Answer

Answer: d
Explanation: The term "deflection" is defined as the transverse displacement of a point on any straight axis to the curved axis. It is expressed in metres (m).

2. Which of the following method is used to determine the slope and deflection at a point?

a) Arithmetic increase method

b) Mathematical curve setting

c) Macaulay's method

d) Lacey's method

View Answer

Answer: c
Explanation: Macaulay's method was devised by Mr WH Macaulay.
Advantages:
i. Gives one continuous expression for bending moment

ii. Constants of integration can be found by using end conditions
iii. By using this method, slope and deflection at any section can be determined throughout the length of the beam.

3. Deflection is denoted by _______

a) i

b) y

c) h

d) e

View Answer

Answer: b
Explanation: The deflection of a point on the axis of the deflected beam is defined as the angle developed in radians with tangent at the section makes with the original axis of the beam.

4. In cantilever beams, the deflection is zero at ___________

a) Free and

b) Fixed end

c) At supports

d) Through out

View Answer

Answer: b
Explanation: The deflection in cantilever beam is always zero at the fixed end and deflection in the cantilever beam at the free end is maximum.

5. Mohr's theorem -¡¡ states?

a) Ax/EI

b) A/Ex

c) A/EI

d) Ae=Ix

View Answer

Answer: a
Explanation: Mohr's theorem -¡¡ states "the intercept taken on a vertical reference line of the tangent at any two points on an elastic line is equal to the moment of BMD between these points, about the reference line divided by flexural rigidity (EI).

6. Calculate the deflection if the slope is 0.0225 radians. Take the distance of centre of gravity of bending moment to free end as 2 metres.

a) 45mm

b) 35mm

c) 28mm

d) 49mm

View Answer

Answer: a
Explanation: The deflection at any point on the elastic curve equal to Ax/EI
But, we know that A/EI is already slope equation.
So, slope × (the distance of centre of gravity of bending moment to free end = 2m).

0.0225 × 2
0.045m ~ 45 mm.

7. In simply supported beams, deflection is zero at _________

a) Mid span

b) Supports

c) Through out

d) Point of action of load

View Answer

Answer: b
Explanation: The deflection is always zero at the supports and the deflection is maximum at the mid span of a symmetrically loaded simply supported beam.

8. Which of the following is not a cross drainage work?

a) Aqueduct

b) Level crossing

c) Head regulator

d) Super passage

View Answer

Answer: c
Explanation: The head regulator is one of the canal regulation works. It can control the entry of silt into the canal. It can be used as a metre for measuring the discharge. It can shut out river floods.

9. Tail escape is also called as ___________

a) Outlet

b) Cross regulator

c) Weir type escape

d) Surplus escape

View Answer

Answer: c
Explanation: The crest of the weir is fixed at canal FSL. When the water level rises above FSL, it is disposed of into the natural drain. Hence, the tale escape is also known as weir type escape.

10. The land where all the water comes from ___________

a) Ridge dam

b) Watershed

c) Meander

d) Groynes

View Answer

Answer: b
Explanation: A watershed can be defined as an interconnected area of land which receives the water from surrounding ridge tops and transports it to a common point such as a lake or stream. All lands and waterways can be found within one watershed or another.

11. ____________ reduces storm water discharge.

a) Rain water harvesting

b) Water harvesting

c) Watershed

d) Watershed management

View Answer

Answer: b
Explanation: The water harvesting is defined as the process of capturing rain where it falls. The objectives of water harvesting are 1) To provide drinking water 2) To provide irrigation water 3) To increase groundwater recharge to reduce storm water discharge.

12. Which of the following is not a soil moisture conservation method?

a) Spreading manure

b) Crop rotation

c) Recharge to ground water

d) By mulches

View Answer

Answer: c
Explanation: The methods which are adopted for preserving the water in the soil from being lost are called as soil moisture conservation methods. The major part of the water is lost through evapotranspiration. The recharge to groundwater is one of the techniques in rainwater harvesting.
advertisement

13. Nutrients like ca, mg, si, al, S, K are lost due to _____________

a) Soil erosion

b) Percolation

c) Water logging

d) Watershed

View Answer

Answer: b
Explanation: The percolation is defined as a downward movement of water through the soil due to the force of gravity. The rapid percolation of water results in loss of plant nutrients and makes the soil acidic.

14. Warabandi has been practiced in India for more than _____________ years.

a) 130 years

b) 125 years

c) 140 years

d) 145 years

View Answer

Answer: b
Explanation: Warabandi is a rotational method for allocation of the available water equally in an irrigation system. It provides continuous rotation of water generally lasts 7 days. It has been effectively practiced in India for more than 125 years.

15. Gold, Copper and lead are the examples of ______

a) Ductility

b) Creep

c) Plasticity

d) Malleability

View Answer

Answer: c
Explanation: Plasticity in the property of Material by which the material can undergo permanent deformation and fails to regain its original shape on removal of load. Examples are gold, lead, etc.
Deflection of Cantilever

1. The ratio of maximum deflection of a beam to its ___________ is called stiffness of the beam.

a) Load

b) Slope

c) Span

d) Reaction at the support

View Answer

Answer: c
Explanation: The stiffness of a beam is a measure of it's resistance against deflection. The ratio of the maximum deflection of a beam to its span can be termed as stiffness of the beam.

2. Stiffness of the beam is inversely proportional to the _____ of the beam.

a) Slope

b) Support reaction

c) Deflection

d) Load

View Answer

Answer: c
Explanation: Stiffness of a beam is inversely proportional to the deflection. Smaller the deflection in a beam due to given external load, greater is its stiffness.

3. The maximum ____ should not exceed the permissible limit to the span of the beam.

a) Slope

b) Deflection

c) Load

dl Bending moment

View Answer

Answer: b
Explanation: The maximum deflection of a loaded beam should not exceed the permissible limit in relation to the span of a beam. While designing the beam the designer should be keep in mind that both strength and stiffness criteria.

4. In cantilever beam the deflection occurs at ______

a) Free end

b) Point of loading

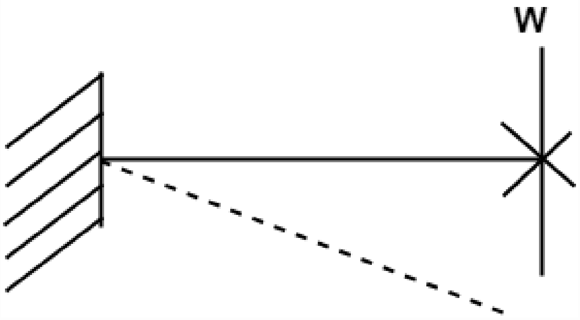
c) Through out

d) Fixed end

View Answer

Answer: a
Explanation: Deflection can be defined as the perpendicular displacement of a point on straight access to the curved axis. In cantilever beams, the maximum deflection occurs at free end.

5. The maximum deflection in cantilever beam of span "l"m and loading at free end is "W" kN.



a) $Wl^3/2EI$

b) $Wl^3/3EI$

c) $Wl^3/4EI$

d) $Wl^2/2EI$

View Answer

Answer: b
Explanation: Maximum deflection occurs at free end distance between centre of gravity of bending moment diagram and free end is x = 2l/3.
As deflection is equal to the slope × "x". The slope = Wl2/2EI radians
Maximum deflection (y) = Ax/EI = $Wl^3/3EI$.

6. In an ideal fluid, the ____________ stresses are pretend to be absent.

a) Bending

b) Shearing

c) Tensile

d) Compressive

View Answer

Answer: b
Explanation: An ideal fluid is a fluid where there is no resistance to the deformation. Ideal Fluids are those Fluids which have no viscosity surface tension. The shear stress is also absent. This fluid is also called as perfect fluid.

7. Air and water are the examples of ___________

a) Non Newtonian fluids

b) Vortex fluids

c) Real fluids

d) Ideal fluids

View Answer

Answer: d
Explanation: The ideal Fluids are imaginary fluids in nature, they are incompressible. These fluids possess low viscosity. Air and water are considered as ideal fluids.

8. _______ fluids are practical fluids

a) Ideal

b) Real

c) Vortex

d) Newtonian

View Answer

Answer: b
Explanation: These fluids possess properties such as viscosity, surface tension. They are compressible in nature. The certain amount of resistance is always offered by the fluids, they also possess shear stress. They are also known as practical fluids.

9. Specific weight of water at 4°C is ____________ N/m^3.

a) 9810

b) 9760

c) 9950

d) 9865

View Answer

Answer: a
Explanation: The specific weight (weight density) of a fluid is weight per unit volume. It is represented by symbol w & it is expressed in Newton per metre cube (N/m^3). The specific weight of water at 4 degree centigrade is 9810 N/m3or 9.81 kN/m^3.

10. The inverse of specific weight of a fluid is __________

a) Specific gravity

b) Specific Volume

c) Compressibility

d) Viscosity

View Answer

Answer: b
Explanation: Specific volume is the volume of the fluid by Unit Weight it is the reciprocal of specific weight is denoted by “v”. SI units are m^3/N.
v= 1/specific weight.

11. Calculate the specific gravity of mercury.

a) 12.5

b) 14.7

c) 13.6

d) 11.8

View Answer

Answer: c
Explanation: The specific gravity of any fluid is the ratio of the specific weight of fluid by specific weight of water. For mercury, the specific weight is 133416 N/m^3. For water, w = 9810 N/m^3.
S = 133416/9810
S= 13.6.

12. Specific gravity of water is __________

a) 0.8

b) 1

c) 1.2

d) 1.5

View Answer

Answer: b
Explanation: The specific gravity is also called as relative density. It is dimensionless quantity and it has no units. The specific gravity of water is the ratio of specific weight of fluid to specific weight of water, as both the numerator and denominator are same. The value is 1.
advertisement

13. Compute the maximum deflection at free end of a cantilever beam subjected to udl for entire span of l metres.

a) $wl^4/8EI$

b) $wl^4/4EI$

c) $wl^3/8EI$

d) $wl^2/6EI$

View Answer

14. Calculate the maximum deflection of a cantilever beam with udl on entire span of 3m the intensity of you udl be 25 kN/m. Take EI as 4000 kN/m^2.

a) 0.052m

b) 0.063m

c) 0.076m

d) 0.09m

View Answer

Answer: b
Explanation: For cantilever beams with udl on entire span, the maximum deflection = $wl^4/8EI$
$y = wl^4/8EI = 25 \times 3^4/ 8 \times 4000 = 0.063$m.

15. Which of the following is not an example of Malleability?

a) Wrought Iron

b) Ornamental silver

c) Torsteel

d) Ornamental gold

View Answer

Answer: c
Explanation: Torsteel is an example of mechanical property ductility. The ductility is a property of a material by which material can be fractured into thin wires after undergoing a considerable deformation without any rupture.
Deflection of Simply Supported

1. ___________ of a beam is a measure of its resistance against deflection.

a) Strength

b) Stiffness

c) Slope

d) Maximum bending

View Answer

Answer: b
Explanation: The ratio of maximum deflection of a beam to its corresponding span is termed as the stiffness of the beam. It is the measure of resistance against the deflection.

2. The maximum induced ____________ stresses should be within the safe permissible stresses to ensure strength of the beam.

a) Tensile

b) Compressive

c) Bending

d) Lateral

View Answer

Answer: c
Explanation: A beam is said to be strengthy when the maximum induced bending and shear stresses are within the safe permissible stresses of the beam material.

3. Elastic line is also called as ____________

a) Deflection curve

b) Plastic curve

c) Linear curve

d) Hooke's curve

View Answer

Answer: a
Explanation: The deflection curve is defined as the line to which the longitudinal axis of a beam deflects or bends under given load. This curve is also known as elastic line or elastic axis.

4. In simply supported beams, the slope is ______________ at supports.

a) Minimum

b) Zero

c) Maximum

d) Uniform

View Answer

Answer: c
Explanation: The slope at any section in the deflected beam is defined as the angle developed in radians which the tangent at the section makes with the actual axis of the proposed beam. In simply supported beams, the slope is maximum at the supports.

5. In simply supported beam deflection is maximum at _____________

a) Midspan

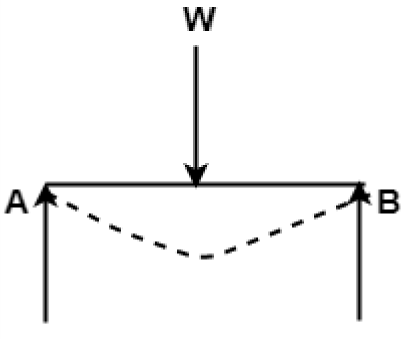
b) Supports

c) Point of loading

d) Through out

View Answer

Answer: a
Explanation: In simply supported beams, deflection is maximum at the mid span of a symmetrically loaded



beam.

6. Calculate the maximum deflection of a simply supported beam if the maximum slope at A is 0.0075 radians and the distance of centre of gravity of bending moment diagram to support A is 1.33 metres.

a) 9.975 mm

b) 9.5 mm

c) 9.25 mm

d) 9.785 mm

View Answer

Answer: a
Explanation: The deflection occurs at support A = A/EI = 0.0075 radians
Maximum deflection = Ax/EI = 0.0075 × 1.33
y = 9.975 mm.

7. _____________ is the best example for accelerator (admixture).

a) Sulphonated formaldehyde

b) Calcium chloride

c) Sulphonated naphthalene

d) Polyglycolesters

View Answer

Answer: b
Explanation: Calcium chloride is more widely used as an accelerator. By adding two percent (2%) of the weight of cacl2 admixture to the Portland cement the Maximum strength is attained within 1-3 days.

8. ______________ is used to reduce the time for hardening of concrete.

a) Accelerators

b) Super plasticizer

c) Retarder

d) Air entraining admixture

View Answer

Answer: c
Explanation: The admixtures (retarders) are generally used to reduce the time for hardening of concrete. They are used in situations like:
i. In hot weather condition, a tendency towards false set is corrected
ii. When concrete is to be placed in difficult positions.

9. Full form of LEED ________

a) Leadership in Energy and Efficiency Development

b) Leadership in Environmental and Energy Design

c) Leadership in Energy and Environmental Design

d) Leadership in Efflorescence and Energy Demand

View Answer

Answer: c
Explanation: LEED stands for Leadership in Energy and Environmental Design. The fly ash is environmentally friendly solutions that meet or exceed performance specifications fly ash contributes a lot to LEED.

10. _____ has a lower heat of hydration.

a) Quarry dust

b) Fly ash

c) Ordinary Portland cement

d) Bulk sand

View Answer

Answer: b
Explanation: The process that liberates heat when water is added to cement is known as heat of hydration. The process of hydration is not instantaneous. The fly ash is possessing lower heat of hydration.

11. The factors that influence rate of hydration is _________

a) The fineness of cement

b) Temperature of cement

c) Quality of water

d) Temperature of water

View Answer

Answer: a
Explanation: The products of hydration are colloidal and increase the surface area of solid paste during hydration and the water is the main ingredient which reacts chemically. The rate of hydration is mainly influenced by temperature of cement.

12. The steel suits best to reinforcement with concrete.

a) False

b) True

View Answer

Answer: b
Explanation: The Steel is be used for reinforcing a concrete for following properties:
i. Steel is about 30 times stronger in compression and 300 times stronger intention compared to concrete.
ii. It develops good bond with concrete
iii. It is highly fire resistant.
advertisement

13. The average crushing strength of precast concrete blocks as per CAI is __________

a) 4.5 N/mm^2

b) 5 N/mm^2

c) 3.5 N/mm^2

d) 4 N/mm^2

View Answer

Answer: c
Explanation: Hollow concrete blocks are used in load bearing walls. In the manufacture of these blocks, the light height aggregates are used. The recommended size is 39 × 19 × 30 cm.
The average crushing strength of blocks Shall be $5N/mm^2$.

14. A simply supported beam of span as shown in the figure is subjected to a concentrated load w at its metre span and also to a uniformly distributed load equality w what is the total diffraction it its midpoint.

a) 18 Wl^3 /384 EI

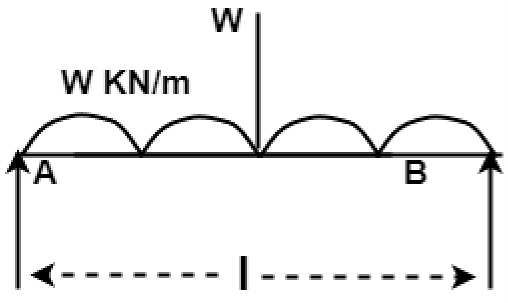
b) 13 Wl^3/ 384 EI

c) 5 Wl^3/ 384 EI

d) 18 Wl^3/ 384 EI

View Answer

Answer: b
Explanation: The total deflection at midpoint of a simply supported beam is



$y = 5Wl^3/ 384 EI + Wl^3/ 48 EI$
$y = 13Wl^3/ 384 EI.$

15. Meander ratio is the ratio of meander belt to ___________

a) Meander depth

b) Meander width

c) Meander length

d) Meander cross-section

View Answer

Answer: c
Explanation: When a river departs from its straight course and follows a sinuous winding path, the river is said to be meandering. Meander ratio is the ratio of meander belt to the meander length.
Analyse Slope of Various Beams

1. A cantilever beam subjected to a point load at free end of span "l" m and possess flexural rigidity (EI).

a) Wl^3 / 6EI

b) Wl^4/ 8EI

c) Wl^2/ 2EI

d) Wl^4/ 5EI

View Answer

Answer: c
Explanation: Area of BMD = A = Wl^2/ 2.
According to Mohr's theorem 1, slope (i) = A/EI = Wl^2/ 2EI radians.

2. Cantilever scaffolding is also known as _____________

a) mason's scaffolding

b) suspended scaffolding

c) needle scaffolding

d) ladder scaffolding

View Answer

Answer: c
Explanation: The cantilever scaffolding consists of platform supported by series of cantilever beams passing through window openings. They are used when it is not possible to fix the standards into the ground. It is also known as needle scaffolding.

3. Scaffolding you generally adopted when the height of structure is above ____________

a) 1.3 m

b) 1.5 m

c) 1.7 m

d) 2.2 m

View Answer

Answer: b
Explanation: Scaffolding is a temporary platform provided with necessary supports close to the work to provide a limited space for the labours and workers for the construction of masonry work of any structure above 1.5 m.

4. The horizontal platform in between any two flights of a staircase is called ____________

a) Landing

b) Balustrade

c) Nosing

d) Stringer

View Answer

Answer: a
Explanation: Landing in stair may be defined as the horizontal platform provided in between any two flights landing. Landing which provides 90 degree turn in the layout of a stair is known as quarter space landing.

5. The ratio of maximum load to the unit area is _________

a) Ultimate bearing capacity

b) Allowable bearing capacity

c) Safe bearing capacity

d) Bearing capacity

View Answer

Answer: d
Explanation: The term bearing capacity of the soil is defined as the maximum load per unit area which the soil will resist safely without yielding or displacement.

6. ______ is part of a structure which transmits the load to the soil underneath.

a) Basement

b) Plinth

c) Lentils

d) Foundation

View Answer

Answer: d
Explanation: The lowest artificial built part of structure which transmits the load of the structure to the soil lying underneath. The foundation of a structure is always constructed below ground level. They distribute the load of structure over large bearing area. It increases the stability of the structure as a whole.

7. Full form of NBC ___________

a) Nominal Building Centre

b) National Building Code

c) National Building Cluster

d) Nominal Buoyance Centre

View Answer

Answer: b
Explanation: NBC stands for National Building Code. According to NBC, all the buildings existing and in construction are classified into number of groups. The respective crystal details are followed with respective synapses.

8. The ultimate bearing capacity/factor of safety = ____________

a) Bearing capacity

b) Allowance bearing capacity

c) Safe bearing capacity

d) Soil consolidation capacity

View Answer

Answer: c
Explanation: The safe bearing capacity of the soil is equal to ultimate bearing capacity divided by certain factor of safety. Roughly a factor of safety of 2 is used for most of the building sites and generally, a factor of safety of 2.5 to 3 is considered for heavy building constructions.

9. _____ is measured on percentage basis.

a) Camber

b) Formation width

c) Super elevation

d) Shoulder

View Answer

Answer: a
Explanation: The rise given to the centre of the carriage way with reference to its edge can be termed as camber. It is expressed as 1 vertical to n horizontal. It is also measured along percentage basis.

10. ______ bridge any opening like a window, door, cupboard etc in a building.

a) Sunshade

b) Lintel

c) Footings

d) Stairs

View Answer

Answer: b
Explanation: Lintel is a horizontal structural member spanning any opening to support loads of the structure coming over it.
i) To facilitate the fixing of doors and windows frames wherever.
ii) They used to receive load from wall constructed over them.

11. The first solar cooker was developed in the year ____________

a) 1947

b) 1953

c) 1945

d) 1960

View Answer

Answer: c
Explanation: The Solar cookers have a very relevant place in the present fuel consumption pattern. The first solar cooker was developed in the year 1945 by Mr M K Ghosh. The main reasons for non- acceptance of this device was a cheap availability of cooking fuel.

12. Solar arrays are defined in terms of ____________

a) Circuits

b) Diodes

c) Kernel

d) Panels

View Answer

Answer: a
Explanation: The solar arrays are electrically defined in terms of circuits each of which contributes a portion of the total current output at some nominally specified array voltage.
advertisement

13. In a cantilever of span "L" subjected to a concentrated load of "W" at a distance of L/3 from free end. The deflection is ________

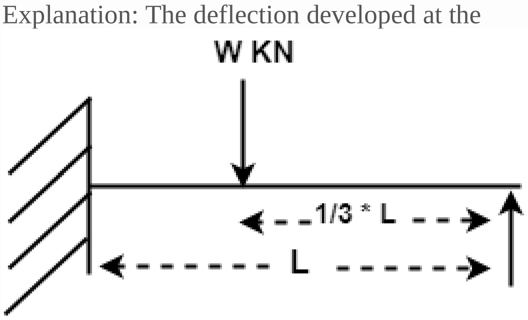
a) $WL^3/3EI$

b) $14WL^3/81EI$

c) $WL^3/81EI$

d) $8WL^3/81EI$

View Answer

Answer: d
Explanation: The deflection developed at the


$y= W \times (2L/3)^3/ 3EI$
$y= 8WL^3/81 EI.$

14. Calculate the slope in a simply supported beam subjected to point load at centre. Take the EI into consideration.

a) $Wl^3/4EI$

b) $Wl^2/16EI$

c) $Wl^3/8EI$

d) $Wl^4/6EI$

View Answer

Answer: b
Explanation: The slope in a beam can be determined by Mohr's theorem 1: i = A/EI.
The BMD of beam portion will be $Wl^2/16$.
The slope (i) = $Wl^2/16EI$.

15. Which of the following is a mechanical property of materials?

a) Surface Tension

b) Compressibility

c) Elasticity

d) Specific volume

View Answer

Answer: c
Explanation: The elasticity is the property by which the body returns to its original shape after the removal of external load. If a body regains completely its original shape is said to be a perfectly elastic material. Rubber, mild steel and copper may be considered to be perfectly elastic within certain limits.
[Analyse Propped Cantilever]

1. In cantilever beams, the extra support is known as ____________

a) Hinch

b) Prop

c) Cripple

d) Indeterminate end

View Answer

Answer: b
Explanation: In case of cantilever beam, some support other than existing ones may be provided to reduce the amount of bending moment developed. The additional support is known as prop.

2. Prop reduces ___________ in the beam.

a) Deflection

b) Slope

c) Shear

d) Moment

View Answer

Answer: a
Explanation: The extra support provided in case of cantilever beam excluding the existing ones is known as prop. It is provided in order to avoid excessive deflection caused due to unequal loading.

3. Which of the following is indeterminate structure?

a) Singly rereinforced beam

b) Propped cantilever beam

c) Over hanging beam

d) Simply supported beam

View Answer

Answer: b
Explanation: The statically indeterminate structures are not capable of being analysed by using equation of statics. We need some more extra conditions for finding unknowns like €i and €y etc. A propped cantilever beam is an example of indeterminate structures.

4. ____________ is used to produce due to temperature variation in indeterminate structures.

a) Stresses

b) Strains

c) Deflections

d) Moment

View Answer

Answer: a
Explanation: Statically indeterminate structures need some extra conditions for the further simplification. Normally stresses are produced due to variation in indeterminate beams.

5. In cantilever beams, the maximum deflection occurs at ___________

a) Fixed end

b) Free end

c) Through out

d) Point of loading

View Answer

Answer: b
Explanation: The maximum deflection in cantilever beam occurs at free end. To resist that excessive deflection, the beam has to be supported by an extra support known as prop.

6. As per IRC, maximum width of lane considered as ____________

a) 2.44 m

b) 2.35 m

c) 3.5 m

d) 3.4 m

View Answer

Answer: a
Explanation: As per IRC, the maximum width be 2.44 m. For a single lane, the width considered is 3.8 m. The pavement having two or more lanes the weight of 3.5 metre per lane is considered sufficient.

7. ______ is the area of land acquired and reserved for future development.

a) Right of pier

b) Carriage way

c) Right of way

d) Camber

View Answer

Answer: c
Explanation: It is desirable to acquire more land because of the cost of adjoining land in variable increases after laying the road. The right of way is area of land acquired and reserved for future development.

8. Stability of high rise vehicles will be affected due to ____________

a) Camber

b) Gradient

c) Super elevation

d) Formation Width

View Answer

Answer: a
Explanation: The rise given to the centre portion of the proposed carriageway with reference to its peripheral edge is called camber. Road users use more in the central portion of road and get worn out. The stability of high rise vehicles will be affected due to heavy camber.

9. The longitudinal rise or fall off road surface along its length is _________

a) Camber

b) Super elevation

c) Gradient

d) Carriage way

View Answer

Answer: c
Explanation: The gradient is defined as the longitudinal rise or fall off road surface love its length is expressed as ratio 1 vertical: n horizontal or as a percentage.

10. Which of the following gradient is usually used in the construction of roads?

a) Exceptional gradient

b) Limiting gradient

c) Hydraulic gradient

d) Ruling gradient

View Answer

Answer: d
Explanation: Ruling gradient may be used as isolated over in flat country roads carrying a large volume of slow moving traffic. Gradient up to the ruling gradient for different terrains. It is to be adopted in normal course of design.

11. According to IRC, the height of the object is taken to the height of ___________ mm.

a) 200 mm

b) 100 mm

c) 450 mm

d) 600 mm

View Answer

Answer: b
Explanation: Sight distance is an important requirement for the safety of travel on highways the height of the object is taken to be at a depth of 100 mm above road.

12. What is the minimum shoulder width provided for village roads?

a) 1.25 m

b) 1.4 m

c) 0.5 m

d) 1 m

View Answer

Answer: c
Explanation: The minimum shoulder width provided for village roads is 0.5m.

Class of road	Minimum shoulder width(Hilly terrain)
NH & SH ways	1.25 m
MD roads	0.5
Village roads	0.5

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13. In case of vertical curves, the _____________ are taken above the road.

a) Gradient

b) Super elevation

c) Earth quantities

d) Summit

View Answer

Answer: c
Explanation: The line of sight of a driver above the road is taken as 1.2m. The height of the object is taken to be height of 100 mm. Sight distance is an important resource requirement for the safety of travel. The designing layout plays a very vital role.

14. The time required for overtaking ____________ seconds.

a) 9 to 14

b) 8 to 10

c) 11 to 15

d) 14 to 19

View Answer

Answer: a
Explanation: In the case of vertical curves, the sight distance is an important requirement for the safety of travel. It it is necessary that sight distance of adequate length should be available in different situations to permit driver enough time and distance to control their vehicles so that there are no unwarranted accidents.

15. _____ provide gradual introduction of super elevation.

a) Transition curves

b) Summit curves

c) Joint curves

d) Adjoining curves

View Answer

Answer: a
Explanation: The transition curves are necessary for a vehicle to have smooth entry of straight section into circular curve. They provide aesthetic experience of the road. They provide a graduate introduction of super elevation.

Deflection of Propped Cantilever

1. The upward deflection caused by the prop is _____________

a) $Pl^3/2EI$

b) $Pl^2/3EI$

c) $Pl^3/3EI$

d) $Pl^4/3EI$

View Answer

Answer: c
Explanation: The deflection developed by proper reaction at free end "y" = $Pl^3/3EI$. A cantilever beam which is supported by an extra support when length of beam increases beyond limit is termed as propped cantilever in order to reduce the excessive deflection.

2. Stiffness of the propped cantilever is _________

a) 4EI/l

b) 6EI/l

c) 8EI/I

d) 5EI/l

View Answer

Answer: a
Explanation: When is a structural member of uniform section is subjected to moment at one end then the moment develops which is required so as to rotate the end to produce unit slope. This is known as of the member. For propped cantilever, the stiffness is 4EI /l.

3. The major losses of energy due to friction are calculated by using _________

a) Ingli's formulae

b) Emperical notations

c) Chezy's Equation

d) Lacey's Theory

View Answer

Answer: c
Explanation: The major loss of energy is caused by friction and it is calculated by using either Darcy – Weisbach equation or chezy's formula. The chezy's formula V = C(mi)1/2. Formula for Darcy's Weisbach equation is = $4fLV^2$ / 2gd.

4. The ratio of A/P is ___________

a) Hydraulic radius

b) Arbitrary datum

c) T E L

d) H G L

View Answer

Answer: a
Explanation: The ratio to the cross sectional area and wetted perimeter is called hydraulic radius. It is also known as hydraulic mean depth. It is denoted by m.

5. Determine the velocity of flow in a pipe if the discharge capacity is 270 litres per second and cross sectional area is 5 cm^2.

a) 4.5 m/s

b) 5.4 m/s

c) 3.4 m/s

d) 2.5 m/s

View Answer

Answer: b
Explanation: Discharge (Q) = 270 lit/sec = $270 \times 10^{-3} = 0.27$ m^3/ s.
Velocity of flow in narrow pipe = Q / A
= 0.27/ 0.05 = 5.4 m/s.

6. Calculate the reaction at prop of cantilever, if the span of beam is 5m and load is 20 kN.

a) 4.25 kN

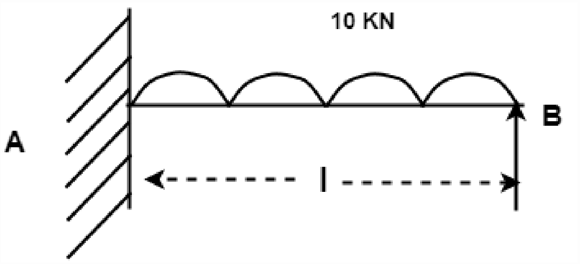
b) 5 kN

c) 6.25 kN

d) 8 kN

View Answer

Answer: c
Explanation: For analysing the prop reaction for a cantilever beam at free end = P = 5W/16
P = 5 × 20 / 16



P = 6.25 kN.

7. The highest point on syphon is known as ____

a) Summit

b) Crown

c) Limb

d) Tread

View Answer

Answer: a
Explanation: A siphon is a long bent pipe used to transfer water from one reservoir to the other reservoir which is located at different elevations. The highest point of the siphon is known as Summit.

8. The position between the summit and the lower reservoir is known as ___________

a) Inlet leg

b) Outlet leg

c) Pressure head

d) Datum

View Answer

9. Full form of TEL is _________

a) Total Emission Line

b) Thermal Electro Light

c) Total Energy Line

d) Total Electro Light

View Answer

Answer: c
Explanation: TEL (Total Energy Line) is the line which is obtained by joining tops of all vertical ordinates showing the sum of pressure head and kinetic head from the centre of the pipe.

10. The sheet of water flowing through a notch is called Nappe.

a) True

b) False

View Answer

Answer: a
Explanation: The sheet of water flowing through a notch or weir is called as Nappe or Vein. The bottom of the notch or the top of weir over which the water flows is known as the sill (or) crest and its height about the bottom of the tank or channel is known as sill height or crest height.

11. The width of broad gauge is ___________

a) 1.445m

b) 1.676m

c) 1 m

d) 0.61 m

View Answer

Answer: b
Explanation: The width of broad gauge is 1.676m.

Types of Gauge	Gauge Width
Broad gauge	1.676 m
Narrow gauge	0.762 m

Light gauge	0.61 m

12. Which of the following gauge is the Indian Standard Gauge?

a) Broad gauge

b) Narrow gauge

c) Light gauge

d) Metre gauge

View Answer

Answer: a
Explanation: The Broad gauge is the Indian Standard gauge. It is widely accepted because of its complexity. The world standard gauge is 1.483 m. Broad gauge enables the rails to act as girders and transmit the wheel load to sleepers.
advertisement

13. _____ is the weakest part in railway track.

a) Rail joint

b) Sleepers

c) Ballast

d) Spikes

View Answer

Answer: a
Explanation: Rail joint is a joint made between two rails jointed together with two fish plates and for fish bolts, to form an expansion gap of 1.5 to 3 mm. Rain joint is the weakest part in railway track.

14. About 90% railway tracks laid with ___________ rails in the world.

a) DH rails

b) BH rails

c) FF rails

d) GH rails

View Answer

Answer: c
Explanation: In flat footed rails, foot is made thinner and wider than head. These rails can be directly fixed to sleepers using slip spikes. This rail invented by Charles Vignoles and hence it is also known as Vignoles rails.

15. Brass is an example of ____________

a) Creep

b) Fatigue

c) Toughness

d) Hardness

View Answer

Answer: c
Explanation: Toughness is a property of a material, which enables it to absorb energy without fracture. It exists due to impact loads. Hence this property is very desirable in every component subject to impact stock loadings. Brass and Mild steel are examples of toughness.
Analyse Fixed Beam

1. A beam which is inbuilt in at its support is called __________

a) Cantilever beam

b) Simply supported beam

c) Fixed beam

d) Continuous beam

View Answer

Answer: c
Explanation: A beam which is built in at its support is known as a fixed beam. In a fixed beam, fixed end moments are developed at the ends. The slope at the end support is zero or (unaltered).

2. Fixed beam is also known as ________

a) Encaster beam

b) Constressed beam

c) In built beam

d) Constricted beam

View Answer

Answer: a
Explanation: Fixed beam is also called Encaster beam or Constraint beam or Built in beam. In a fixed beam the fixed end moments develop at the end supports. In these beams, the supports should be kept at the same level.

3. In fixed beams, the slope at the supports be ____________

a) Minimum

b) Zero

c) Maximum

d) Throughout

View Answer

Answer: b
Explanation: The fixed beam is stronger, stiffer and more stable. The slope at the supports is zero. Maximum bending moment at the centre is reduced because of fixing moments developed at supports.

4. ________ changes induce large stresses in a fixed beam.

a) Lateral

b) Deflection

c) Temperature

d) Slope

View Answer

Answer: c
Explanation: In fixed beam, sinking of any one support sets large stresses. The temperature changes induce the largest stress. The moving loads make the degree of fixity at support uncertain.

5. A beam 6 metres long is fixed at it ends. It carries a udl of 5 kN/m. Find the maximum bending moment in the beam.

a) 15 kNm

b) 20 kNm

c) 35 kNm

d) 40 kNm

View Answer

Answer: a
Explanation: A beam carrying udl along its entire span, the maximum bending moment developed = wl^2 / 12.
= 5×6^2 / 12.
15 kNm.

6. Calculate the maximum deflection of a fixed beam carrying udl of 5 kN/m. The span of beam is 6 m. Take E = 200kN/m^2 and I = 5×10^7 mm^4.

a) 1.865 m

b) 2.235 m

c) 1.6875 m

d) 2.5 m

View Answer

Answer: c
Explanation: The maximum deflection in fixed beam is wl^4/384EI
= $5 \times 6^4 \times 10^9$/ $384 \times 200 \times 5 \times 10^7$
= 1.6875 mm.

7. Calculate the load intensity of fixed beam if the maximum deflection shall not exceed 1/ 400 of the span. Take EI as 10^{10} kN mm^2.

a) 40 kN

b) 35 kN

c) 45 kN

d) 60 kN

View Answer

Answer: c
Explanation: When the maximum deflection equals to 1 / 400 of the span.
Wl^4/ 384 EI = 1 /400.
W= 384 EI / 400 l^3
W = 45 kN.

8. ____ is known as a serpentine curve.

a) Circular curve

b) Transition curve

c) Reverse curve

d) Leminiscate curve

View Answer

Answer: c
Explanation: Reverse curves are provided in difficult terrain. In these curves, the simple curves have a common tangent. They consist of two simple curves of same or different radii. These curves are also known as serpentine curves.

9. The maximum super elevation to be provided is ___

a) 2 in 15

b) 1 in 15

c) 1 in 10

d) 2 in 10

View Answer

Answer: b
Explanation: According to IRC, the maximum super elevation of 1 in 15 is to be provided. Minimum super elevation is required for proper drainage. If the super elevation calculated is less than the camber no superelevation is to be provided.

10. ______ curves are used to solve the problems of land acquisition.

a) Vertical curves

b) Horizontal curves

c) Circular curves

d) Transition curves

View Answer

Answer: b
Explanation: A horizontal curve is the curve in plane to provide change in direction to the centre line of the alignment. It is used to preserve the certain existing amenities and to solve the problems of land acquisition.

11. The limiting gradient for mountainous terrain is ________

a) 6.00 %

b) 7.00 %

c) 8.00 %

d) 5.00 %

View Answer

Answer: a
Explanation: The limiting gradient for mountainous terrain is 6.00%.

Type of terrain	Ruling Gradient	Limiting Gradient	Exceptional Gradient
Plain	3.30%	5.00%	6.70%
Mountainous	5.00%	6.00%	7.00%

12. Which of the following do not have units?

a) Specific weight

b) Specific gravity

c) Specific volume

d) Mass density

View Answer

Answer: b
Explanation: Specific gravity is defined as the ratio of the specific weight of solids to the specific weight of an equal volume of water at the temperature. It is denoted by S. As it is a ratio, it doesn't possess units.
advertisement

13. In engineering properties of soils, the “e” denotes?

a) Compressibility

b) Water content

c) Porosity

d) Voids ratio

View Answer

Answer: d
Explanation: Void ratio is defined as the ratio of the total volume of voids to volume of soil solids. It is expressed as a decimal.

14. _____ is a glacier deposit of sand, gravel or clay.

a) Till

b) Tull

c) Loess

d) Mart

View Answer

Answer: a
Explanation: The deposits made by glaciers are called drifts. The deposits made by the melting of glaciers are called till. Till is a stratified soil.

15. The bearing capacity of laminated rocks used in foundation is ___________

a) 1450 kN/m^2

b) 1620 kN/m^2

c) 1785 kN/m^2

d) 2125 kN/m^2

View Answer

Answer: b
Explanation: The bearing capacity of laminated rocks used in foundation is 1620 kN/m^2.

Type Of Rock	Bearing capacity in kN/m^2
Granite	3240
Laminated	1620
Residual	880
Soft	440

Deflection of Fixed Beam

1. In fixed beams, the maximum deflection at __________ is reduced.

a) Centre

b) Supports

c) At point of loading

d) Through out

View Answer

Answer: a
Explanation: In fixed beams, the maximum bending moment developed at the centre is reduced. Hence it results in the reduction of deflection of a beam at its centre considerably.

2. Fixing couples means _____

a) End moments

b) Support couples

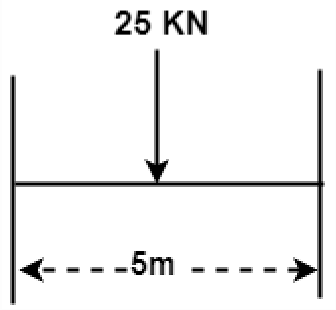
c) Support moments

d) End supports

View Answer

Answer: c
Explanation: If the ends are built in, end moments are automatically developed. These moments are called as fixing couples or fixing moments or support moments.

3. Calculate the maximum bending moment in fixed beam for the following figure.



a) 17 kN-m

b) 12.5 kN-m

c) 15.625 kN-m

d) 18 kN-m

View Answer

Answer: c
Explanation: For a fixed beam, the maximum bending moment is w×l / 8.
Maximum bending moment (M) = 25 × 5 / 8
= 15.625 kNm.

4. _________ is provided to prevent the debris from entering into the penstock.

a) Tash rack

b) Surge tank

c) Anchor blocks

d) Power house

View Answer

Answer: a
Explanation: Trash rack is a structure which is provided to prevent the debris from entering into the penstock. The trash racks are usually located ahead of the gates. The debris which is collected on the trash rack may be removed either manually or with the help of automatic power driven racks.

5. ___________ regulates the speed of turbine.

a) Tail race

b) Anchor blocks

c) Power house

d) Surge tank

View Answer

Answer: d
Explanation: The surge tank controls the pressure variations in a penstock. Thereby the penstock is protected from effects of water hammer pressure. The surge tank is provided on large penstock to regulate the speed of the turbine.

6. The sheet of water flowing through a notch is called _________

a) Sill

b) Crest

c) Scour

d) Nappe

View Answer

Answer: d
Explanation: The sheet of water flowing through notch or weir is called as the nappe or vein. The bottom of the notch or the top of the weir over which the water flows is known as the sill.

7. Which of the following is empirical formula coined by Francis?

a) 2.36 $LH^3/2$

b) 1.84 $LH^3/2$

c) 3.34 $LH^3/2$

d) 1.96 $LH^3/2$

View Answer

Answer: b
Explanation: Francis proposed the following formula for discharge over rectangular weir by assuming Cd = 0.623
Q = 1.84 $LH^3/2$
Where Q = discharge in $m^3/$ s.

8. Calculate discharge of a weir 2 metre long with a water flow over a head of 250 mm use Francis formula.

a) 0.34 m^3/s

b) 0.46 m^3/s

c) 0.25 m^3/s

d) 0.65 m^3/s

View Answer

Answer: b
Explanation: Given that:
Length of weir = L = 2m.
Head over the weir = 0.25 m

Using Francis formula; $Q = 1.84 LH^3/2 = 1.84 \times 2\times(0.25)^3/2$.
$Q = 0.46 m^3/s$.

9. 1 litre = ____________ m^3.

a) 10^4

b) 10^3

c) 10^{-3}

d) 10^{-4}

View Answer

Answer: c
Explanation: 1 litre = $10^{-3}m^3$.
For example, Q = 40 lit/min = 40/60 lit/sec = $0.67 \times 10^{-3}m^3$/sec.

10. In cipoletti weir, the side slopes are _______________

a) 1 in 3

b) 1 in 2

c) 1 in 5

d) 1 in 4

View Answer

Answer: d
Explanation: A trapezoidal weir, which has side slopes of 1 horizontal to 4 vertical, is called as cipoletti weir. The discharge over a cipolletti weir is equal to the discharge over a rectangular Weir without end contractions.

11. The flow of thick oil through a small tube is an example for _________

a) Laminar flow

b) Turbulent flow

c) Rotational flow

d) Steady flow

View Answer

Answer: a
Explanation: A flow is said to be laminar when the paths taken by the individual particles do not cross one another. It is also called as streamline flow. The flow of thick oil through a small tube is an example for laminar flow.

12. Flow in rivers is an example of __________ flow.

a) Rotational

b) Laminar

c) Compressible

d) Turbulent

View Answer

Answer: d
Explanation: A flow is said to be turbulent when the liquid particles move in a zig-zag way and their paths also cross each other. The flow in rivers at the time of floods is a perfect example of turbulent flow.
advertisement

13. What is the point of contraflexure in a fixed beam of span 5m?

a) 3m

b) 2.75 m

c) 3.75 m

d) 4 m

View Answer

Answer: c
Explanation: The point of contraflexure from any support be 3×l / 4.
From support A = 3l/4 = 3×5/4 = 3.75 m.
From support B = 3l/4 = 3×5/4 = 3.75 m.

14. Water table should be at least ___________ m below subgrade.

a) 1.5m

b) 3 m

c) 1.2 m

d) 2.5 m

View Answer

Answer: c
Explanation: The top level of water table should be below the level of subgrade. Water table should be at least 1.2 metres below subgrade. If the soil is impermeable, the longitudinal and transverse drains have to be provided to lower the water table.

15. Torsteel is an example of ________

a) Elasticity

b) Plasticity

c) Malleability

d) Ductility

View Answer

Answer: d
Explanation: Ductility is one of the mechanical properties of materials. It is defined as the property possessed by the material by which material can be drawn into thin wires after undergoing deformation without any rupture. Torsteel is an example of ductility property.
Analyse Indeterminate Beam

1. A beam which is supported on more than two supports is called as_______

a) Fixed beam

b) Continuous beam

c) Cantilever beam

d) Simply supported beam

View Answer

Answer: b
Explanation: A beam which is supported on more than two supports is known as a continuous beam. The intermediate supports of a continuous beam are always subjected to some bending moment.

2. Which of the following them is also known as multi span beam ________

a) Cantilever beam

b) Simply supported beam

c) Fixed beam

d) Continuous beam

View Answer

Answer: d
Explanation: A continuous beam is a beam which is supported on more than two supports. It is also known as multi span beam. The degree of indeterminacy depends upon the number of supports and nature of supports.

3. In deflection of a continuous beam, when loaded there will be convexity upwards over _________ supports.

a) End

b) Alternate

c) Intermediate

d) Every

View Answer

Answer: c
Explanation: When a continuous beam is loaded, the deflection of the beam takes place along the intermediate supports with convexity upwards.

4. The _________ is more over the supports then at midspan in continuous beams.

a) Slope

b) Bending moment

c) Deflection

d) Shear force

View Answer

Answer: b
Explanation: The bending moment is more over the supports then at midspan in case of continuous beams and hence the weight of the beam does not materially affect the stresses in the beam.

5. Moment distribution method is also known as __________

a) Hardy Cross method

b) Macaulay's method

c) Mohr's Theorems method

d) Kennedy's theory

View Answer

Answer: a
Explanation: The moment distribution method is evolved by professor Hardy cross in 1932 and can be used with advantage to analyse statically indeterminate structures and frames with rigid joint this method is simple and involves a process of relaxation.

6. Which of the following device is not based on Bernoulli's equation?

a) Venturimeter

b) Orificemeter

c) Hydraulic lift

d) Pitot tube

View Answer

Answer: c
Explanation: Bernoulli's equation is applied to incompressible liquid flow where energy consideration is

involved. Some of the hydraulic devices which are based on Bernoulli's equation are venturimeter, orificemeter, Pitot tube.

7. Pascal's law is applied in ____________

a) Pitot tube

b) Hydraulic lift

c) Orificemeter

d) Venturimeter

View Answer

Answer: b
Explanation: Hydraulic lift is an example of Pascal's law. According to Pascal's law the "At a given point, the force is applied in all directions" and the rest are the examples of Bernoulli's equation.

8. Which of the following devices measures the velocity of flow?

a) Pitot tube

b) Venturimeter

c) Orificemeter

d) Hydraulic jacks

View Answer

Answer: a
Explanation: A pitot tube is a device which is used for measuring the velocity of flow at any point in a pipe or channel. It is based on the principle that if the velocity of flow at any point becomes zero, the pressure there is increased due to the conversion of kinetic energy into pressure energy.

9. Which of the following is the coefficient of pitot tube?

a) 0.96

b) 0.98

c) 0.97

d) 0.95

View Answer

Answer: b
Explanation: The velocity (V) = Cv $(2gh)^{1/2}$.
Where Cv = coefficient of pitot tube = 0.98
h= difference between liquid levels in the pitot tube and piezometer.

10. Bernoulli's equation is applicable only for ___________ flow.

a) Rotational

b) Steady

c) Compressible

d) Unsteady

View Answer

Answer: b
Explanation: The Bernoulli's equation has been derived on the assumption that the velocity is uniform over the section. The Bernoulli's equation is applicable only for steady, incompressible and irrotational flows.

11. Flow of water when a tap is just open is an example of __________ flow.

a) Uniform

b) Steady

c) Un steady

d) Turbulent

View Answer

Answer: c
Explanation: The flow is said to be unsteady if at any point in flowing liquid any one or all flow characteristics change with time liquid that is flowing at a changing rate as in the case. The flow in the tap is just opened is a perfect example for unsteady flow.

12. A Straight cantilever of uniform area carries a udl over its entire length. If the free end of a cantilever is now prop at the level of the fixed end, the vertical force required at the prop be __________

a) 3/4 W

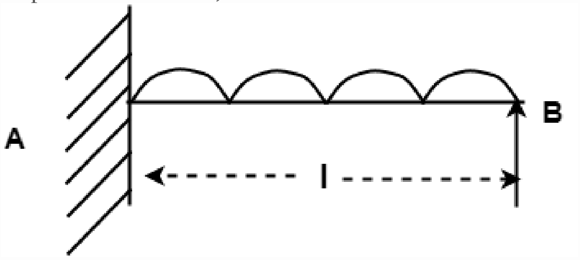
b) 3/8 W

c) 5/8 W

d) W

View Answer

Answer: b
Explanation: Where, total load on beam = W = wl



$Wl^3/8EI = B\times l^3 / 3EI$
Reaction at B = 3W/8.
advertisement

13. ____________ is used to empty a tank of water having no outlet.

a) Venacontracta

b) Syphon

c) Summit

d) Dyne

View Answer

Answer: b
Explanation: A syphon is used to connect two different elevations separated by a mountain
They also used to supply water to a town over a ridge and supply type of water having an outlet.

14. Find out the elongation of a tie of 2m long, if the axial rigidity is 5000×10^4 mm^2. The axial pull be 20 kN.

a) 0.8 mm

b) 0.6 mm

c) 0.5 mm

d) 1mm

View Answer

Answer: a
Explanation: Axial pull 20000N.
Elongation : Pl/ AE
Change in length = PL/ AE
= $20 \times 10/500 \times 11 \div 10^3$.

15. Glass is an example of _________

a) Elastic

b) Brittle

c) Toughness

d) Hardness

View Answer

Answer: b
Explanation: Brittleness is a property of a material by which It Breaks without much deformation produce his property generally considered to be highly objectionable in engineering.
Deflection of Continuous Beam

1. The maximum negative bending moment in fixed beam carrying udl occurs at ________

a) Mid span

b) 1/3 of the span

c) Supports

d) Half of the span

View Answer

Answer: c
Explanation: In case of fixed beam subjected to gravity loads maximum hogging or negative bending moment develops at the supports. At centre, the maximum bending moment is reduced.

2. A fixed beam of the uniform section is carrying a point load at the centre, if the moment of inertia of the middle half portion is reduced to half its previous value, then the fixed end moments will ______

a) Increase

b) Remains constant

c) Decrease

d) Change their direction

View Answer

Answer: a
Explanation: The flexural rigidity value is reduced in middle half portion of the second case fixed end moments which have developed in a beam section will be increases.

3. In propped cantilevers, the prop reaction is 3/8 wl.

a) True

b) False

View Answer

Answer: a
Explanation: In propped cantilever beam net deflection at fixed end is zero therefore $Rl^3/3EI = wl^4/8EI$
R= 3wl/8.

4. A propped cantilever beam carrying total load “W” distributed evenly over its entire length calculate the vertical force required in the prop.

a) 3/4 W

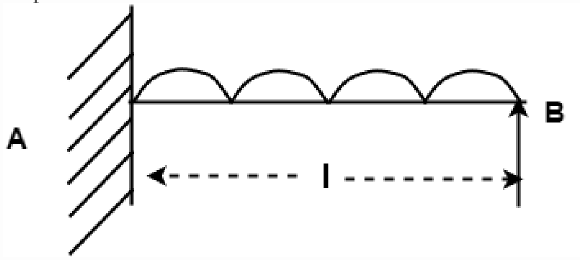
b) W

c) 5/8 W

d) 3/8 W

View Answer

Answer: d
Explanation: Therefore Total load on beam = W = wl



$Rl^3/3EI = Wl^3/ 8EI$.
R = 3W/8.
The vertical force required at the prop is 3W/8.

5. _____ is a small opening made in the bottom or sides of a tank.

a) Mouthpiece

b) Orifice

c) Sill

d) Sluice

View Answer

Answer: b
Explanation: An orifice is defined as a small opening of any cross sections such as circular, square, triangular& rectangular etc. made in the walls or the bottom of a tank containing liquid in it through which the liquid flows.

6. A mouthpiece is a short length of a pipe which is not more than __________ times its diameter.

a) 3-4

b) 5-6

c) 1 -2

d) 2-3

View Answer

Answer: d
Explanation: A mouth piece is defined as a short length of a pipe which is not more than two or three times its diameter, fitted to an orifice of same diameter provided especially in a tank containing liquid.

7. The section which has a minimum cross sectional are in a flow is known as _______

a) Vena contracta

b) Thyrocade

c) Submergent

d) Upstream edge

View Answer

Answer: a
Explanation: The section of the jet, at which the flow in a liquid has a minimum cross sectional area, is known as vena contracta. This is due to the fact that liquid particles do not change their directions abruptly.

8. Bell mouthed orifices can be categorised in according to ___________

a) Size

b) Shape

c) Shape of upstream

d) Nature of discharge

View Answer

Answer: c
Explanation: The orifices are classified on the basis of their size, shape, shape of upstream edge and discharge conditions. According to shape of the upstream edge, the orifices are classified as sharp edged orifice and Bell mouthed orifice.

9. Which of the following is not a hydraulic coefficient?

a) Coefficient of contraction

b) Coefficient of discharge

c) Coefficient of viscosity

d) Coefficient of velocity

View Answer

Answer: c
Explanation: Coefficient of viscosity can be defined as the shear stress required producing unit rate of angular deformation. It is also called as dynamic viscosity.

10. Theorotical velocity = _______

a) $(2gh)^{1/3}$

b) $(2gh)^{1/2}$

c) $(2gh)^{1/4}$

d) 2gh

View Answer

Answer: b
Explanation: The coefficient of velocity the ratio of actual velocity of the liquid to the theoretical velocity.
Theoretical velocity = $(2gh)^{1/2}$.
Where h = liquid head above the centre of orifice.

11. The value of Cv varies _______ to ________

a) 0.95 – 0.99

b) 0.93 – 0.95

c) 0.97 – 1

d) 0.94 – 0.96

View Answer

Answer: a
Explanation: The value of coefficient of velocity (Cv) vary from 0.95 to 0.99 for different orifices depending on shape, size of the orifices and the head under which floor takes place.

12. The Cv taken for sharp edged orifice generally is _________

a) 0.97

b) 0.98

c) 0.95

d) 0.99

View Answer

Answer: b
Explanation: The Cv taken for sharp edged orifice generally is 0.98.

Value For Sharp edged orifice	Hydraulic coefficient
0.98	Cv
0.64	Ca
0.62	Cd

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13. Coeffecient of discharge varies from ___________ to __________

a) 0.64 to 0.68

b) 0.61 to 0.65

c) 0.63 to 0.67

d) 0.67 to 0.7

View Answer

Answer: b
Explanation: Coefficient of discharge is defined as the ratio between actual discharge from an orifice and its theoretical discharge. It varies from 0.61 to 0.65.Generally, the value for Cd = 0.62 Sir sharp edged orifice.

14. The relation between hydraulic coefficients is Cd = Cc × Cv.

a) False

b) True

View Answer

Answer: b
Explanation: Cd = Qa / Qth
But Qa = ac V =(Cc a) × Cv × $(2gh)^{1/2}$.
Qth = a Vth
Cd = Qa Qth = Cc a × Cv $(2gh)^{1/2}$/a × $(2gh)^{1/2}$.
Cd = Cc × Cv.

15. Calculate the actual velocity of jet if the coefficient of velocity is 0.97. The head of water on the orifice of diameter 2 cm is 6 m.

a) 11 m/s

b) 12 m/s

c) 10.5 m/s

d) 13 m/s

View Answer

Answer: c
Explanation: We know that quotient of velocity the ratio of actual velocity to theoretical velocity. The actual velocity of jet Va = Cv × $(2gh)^{1/2}$.
Va = 0.97 $(2\times 9.81 \times 6)^{1/2}$.
Va = 10.5 m/s.
Definition of Torque

1. Torque is __________ moment.

a) Twisting

b) Shear

c) Bending

d) Couple

View Answer

Answer: a
Explanation: A cylindrical shaft is subjected to twisting moment or torque when a force is acting on the member tangentially at some radius in a plane of its cross section.

2. Twisting moment is a product of __________ and the radius.

a) Direction

b) Velocity

c) Force

d) Acceleration

View Answer

Answer: c
Explanation: Twisting moment will be equal to the product of force and radius. When a shaft is subjected to a twisting moment, every cross section of the shaft will surely experience shear stress.

3. Torsion is denoted by __________

a) R

b) Q

c) T

d) N

View Answer

Answer: c
Explanation: If the moment is applied in a plane perpendicular to the longitudinal axis of the beam (or) shaft it will be subjected to torsion. Torsion is represented or denoted by T.

4. The SI units for torsion is __________

a) N m

b) N

c) N/m

d) m

View Answer

Answer: a
Explanation: As torsion is a product of perpendicular force and radius, the units will be N m.
Torque is also known as torsion or twisting moment or turning moment.

5. _____________ torsion is produced when twisting couple coincides with the axis of the shaft.

a) Exact

b) Pure

c) Nominal

d) Mild

View Answer

Answer: b
Explanation: When a member is subjected to the equal and opposite twisting moment at its ends, then the member is said to be subjected under pure torsion. Pure Torsion is often produced when the axis of the twisting couple coincides with the axis of the shaft.

6. Which of the following is known as Re-entrant mouthpiece?

a) External Mouthpiece

b) Convergent Mouthpiece

c) Internal Mouthpiece

d) Cylindrical Mouthpiece

View Answer

Answer: c
Explanation: According to the position, mouthpieces are classified as an external mouthpiece and internal mouthpiece. If the tube projects inside the tank, it is called an internal mouthpiece or re-entrant or borda's mouthpiece.

7. Micrometre contraction gauge is used to determine ___________

a) Cv

b) Cc

c) Ca

d) Cd

View Answer

Answer: b
Explanation: The coefficient of contraction may be determined experimentally by measuring the radius of jet as vena contact with the help of micro meter contraction gauge. This method is not accurate because it is very difficult to measure the correct radius of jet.

8. What is the general value for coefficient of contraction?

a) 0.64

b) 0.67

c) 0.66

d) 0.7

View Answer

Answer: a
Explanation: The ratio of the area of a jet at vena contracta to the area of orifice is known as the coefficient of contraction. The value of Cc varies from 0.61 to 0.69 for different orifices. Generally, for sharp edged orifice the value of Cc may be taken as 0. 64.

9. The Cd value for internal mouthpiece running free is ___________

a) 0.6

b) 0.5

c) 0.7

d) 0.8

View Answer

Answer: b
Explanation: The Cd value for internal mouthpiece running free is 0.5.

Type Of Mouthpiece	Value of Cd
External cylindrical mouthpiece	0.855
Internal mouthpiece running free	0.5
Internal mouthpiece running full	0.707

10. ________ is the velocity with which water reaches the notch or before it flows over it.

a) Velocity of contact

b) Velocity of moment

c) Velocity of approach

d) Velocity of head

View Answer

Answer: c
Explanation: The velocity of approach is defined as the velocity with which water reaches the notch or weir before it flows over it. This velocity of approach creates an additional head "ha" equal to Va2 / 2g and effect head over the notch is increased to H+ha.

11. Which of the following formula was proposed by Bazin?

a) $m(2g)^{1/2}\times LH^{3/2}$

b) $m(2g)^{1/2}\times H^{3/2}$

c) $n(2g)^{1/2}\times LH^{4/3}$

d) $n(2g)^{1/2}\times LH^{3/2}$

View Answer

Answer: a
Explanation: Bazin proposed the following formula for the discharge over rectangular weir:
$Q = m(2g)^{1/2}\times L H^{3/2}$.
Where m = 0.405 + 0.003/H.

12. For measuring low discharges ______________ notch is preferred.

a) Rectangular

b) Stepped

c) Trapezoidal

d) Triangular

View Answer

Answer: d
Explanation: A triangular notch is preferred to a rectangular notch due to
i. The nappe emerging from a triangular notch has the same shape for all heads. As such the value for the triangular notch is constant for all heads.
ii. The expression for discharge for right angle triangle law not is very simple.
advertisement

13. Which of the following is also known as V notch?

a) Trapezoidal

b) Stepped

c) Triangular

d) Sharp edged

View Answer

Answer: c
Explanation: A triangular notch also called a v notch is of triangle shape with apex down. The expression of the discharge over triangular notch or weir is Q = 8/15 Cd $(2g)^{1/2} \times H^{5/2}$.

14. Calculate the discharge over rectangular Weir of 3 metres length under the head of 400mm.Use Francis formula.

a) 1.268 m^3/s

b) 1.396 m^3/s

c) 1.475 m^3/s

d) 1.528 m^3/s

View Answer

Answer: b
Explanation: Francis formula for discharge Q = 1.84 $LH^3/2$.
Given L = 3m & H = 0.4m
Q = 1.84 × 3 × $(0.4)^3/2$.
Q = 1.396 m^3/s.

15. _____ converts mechanical energy into hydraulic energy.

a) Dynamo

b) Pump

c) Turbine

d) Generator

View Answer

Answer: b
Explanation: A pump is a mechanical device which converts the mechanical energy into hydraulic energy. The hydraulic energy is in the form of pressure energy. The pumps are generally used for lifting liquid from a lower level to a higher level.

Torsion Equation

1. Torsional sectional modulus is also known as _________

a) Polar modulus

b) Sectional modulus

c) Torsion modulus

d) Torsional rigidity

View Answer

Answer: a
Explanation: The ratio of polar moment of inertia to radius of section is called Polar modulus or Torsional section modulus. Its units are mm^3 or m^3 (in SI).

2. ________ is a measure of the strength of shaft in rotation.

a) Torsional modulus

b) Sectional modulus

c) Polar modulus

d) Torsional rigidity

View Answer

Answer: c
Explanation: The polar modulus is a measure of the strength of shaft in rotation. As the value of Polar modulus increases torsional strength increases.

3. What are the units of torsional rigidity?

a) Nmm^2

b) N/mm

c) N-mm

d) N

View Answer

Answer: a
Explanation: The product of modulus of rigidity (C) and polar moment of inertia (J) is called torsional rigidity. Torsional rigidity is a torque that produces a twist of one radian in a shaft of unit length.

4. The angle of twist can be written as ________

a) TL/J

b) CJ/TL

c) TL/CJ

d) T/J

View Answer

Answer: c
Explanation: The angle of Twist = TL/CJ
Where T = Torque in Nm
L = Length of shaft
CJ = Torsional rigidity.

5. The power transmitted by shaft SI system is given by __________

a) $2\pi NT/60$

b) $3\pi NT/60$

c) $2\pi NT/45$

d) NT/60 W

View Answer

Answer: a
Explanation: In SI system, Power (P) is measured in watts (W) ; $P = 2\pi NT/60$
Where T = Average Torque in N.m
N = rpm
$= 2\pi NT/ 45$ 1 watt = 1 Joule/sec = 1N.m/s.

6. Area of catchment is measured in ___________

a) mm^3

b) Km^2

c) Km

d) mm

View Answer

Answer: b
Explanation: Catchment area can be defined as the area which contributes the surplus water present over it to the stream or river. It is an area which is responsible for maintaining flow in natural water bodies. It is expressed in square kilometres.

7. ______ catchment area is a sum of free catchment area and intercepted catchment area.

a) Total

b) Additional

c) Combined

d) Overall

View Answer

Answer: c
Explanation: Combined catchment area is defined as the total catchment area which contributes the water in to stream or a tank. Combined Catchment area = Free catchment area + intercepted catchment area.

8. ___________ has steep slopes and gives more run off.

a) Intercepted Catchment Area

b) Good Catchment Area

c) Combined Catchment Area

d) Average Catchment Area

View Answer

Answer: b
Explanation: Good catchment area consists of hills or rocky lands with steep slopes and little vegetation. It gives more run off.

9. How many number of rain gauge stations should be installed an area between 250 to 500 km^2.

a) 2

b) 4

c) 3

d) 5

View Answer

Answer: c
Explanation: 3 number of rain gauge stations should be installed an area between 250 to 500 km^2.

Area of Basin(Km^2)	Number of Rain gauge stations

< 125	1
125 – 250	2
250 – 500	3

10. Trend of rainfall can be studied from ________

a) Rainfall graphs

b) Rainfall records

c) Rainfall curves

d) Rainfall cumulatives

View Answer

Answer: b
Explanation: Rainfall records are useful for calculating run off over a basin. By using rainfall records estimate of design parameters of irrigation structures can be made. The maximum flow due to any storm can be calculated and predicted.

11. Estimation of run off "R" is 0.85P-30.48.

The above formula was coined by ______

a) Lacey

b) Darcy

c) Khosla

d) Ingli

View Answer

Answer: d
Explanation: Run off can be estimated by
R= 0.85P-30.48
Where R = annual runoff in mm
P = annual rainfall in mm.

12. Monsoon duration factor is denoted by _________

a) P

b) S

c) F

d) T

View Answer

Answer: c
Explanation: Monsoon duration factor is denoted by F.

Class of Monsoon	Monsoon Duration Factor (F)
Very Short	0.5

Standard length	1.0
Very long	1.5

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13. Runoff coefficient is denoted by ________

a) P

b) N

c) K

d) H

View Answer

Answer: c
Explanation: The runoff coefficient can be defined as the ratio of runoff to rainfall. Rainfall and runoff can be interrelated by runoff coefficient.
R = KP
K = R/P [K = is a runoff Coefficient depending on the surface of the catchment area].

14. __________ is a graph showing variations of discharge with time.

a) Rising limb graph

b) Crest graph

c) Hydraulic graph

d) Gauge graph

View Answer

Answer: c
Explanation: Hydrograph is a graph showing variations of discharge with time at a particular point of the stream. The hydrograph shows the time distribution of total run off at a point of measurement. Maximum flood discharge can also be calculated by using hydrograph.

15. Calculate the torque which a shaft of 300 mm diameter can safely transmit, if the shear stress is 48 N / mm^2.

a) 356 kNm

b) 254 kNm

c) 332 kNm

d) 564 kNm

View Answer

Answer: b
Explanation: Given, the diameter of shaft D = 300 mm
Maximum shear stress fs = 48 N/mm^2.
Torque = T = $\pi/16$ fs D^3
= 254469004.9 Nmm
= 254 kNm.
Shear Stress and Twisting Moment

1. The intensity of shear stress at a section is _______ to the distance of the section from the axis of the shaft.

a) Inversely proportional

b) Directly proportional

c) Equal

d) Parallel

View Answer

Answer: b
Explanation: The intensity of shear stress at a section is directly proportional to the distance of the section from axis of the shaft. The shear stress at a distance from the centre of the shaft is given by fs/R × r.

2. The shear stress is _____________ at the axis of the shaft.

a) Minimum

b) Maximum

c) Zero

d) Uniform

View Answer

Answer: c
Explanation: The shear stress is zero at the axis of the shaft and the shear stress is linearly increasing to the maximum value at the surface of the shaft.

3. The shear stress at the outer surface of hollow circular section is __________

a) Zero

b) Maximum

c) Minimum

d) Can't determined

View Answer

Answer: b
Explanation: The shear stress in a hollow circular section varies from maximum at the outer surface to a minimum (but not zero) in the inner face. The minimum value should be greater than zero.

4. The hollow shaft will transmit greater ________ then the solid shaft of the same weight.

a) Bending moment

b) Shear stress

c) Torque

d) Sectional Modulus

View Answer

Answer: c
Explanation: For the same maximum shear stress, the average shear stress in a hollow shaft is greater than that in a solid shaft of the same area. Hence the hollow shaft will transmit greater torque than the solid shaft of the same weight.

5. The process of measurement of discharge and water level of a river is called __________

a) Meandering

b) River coursing

c) River gauging

d) Scouring

View Answer

Answer: c
Explanation: The process of measurement of discharge and water level of a river is known as river gauge. It helps in determining the characteristics of flow different times during the year.

6. The quantity of losses in the river can be measured with an aid of ________

a) Runoff coefficient

b) Hydrograph

c) River Coursing

d) River gauging

View Answer

Answer: d
Explanation: By measuring river discharge for number of years, it is possible to know the available and dependable supply. The river gauging helps in measuring discharge in the river and the quantity of losses can also be known.

7. The site for the river gauging station should not be liable to ____________

a) Silting

b) Coursing

c) Meandering

d) Runoff

View Answer

Answer: a
Explanation: River gauging station site should be selected in such a way that the site should be stable and there should not be any choice of scouring and silting. At the gauge site, the river section should be at right angles to the flow of the river.

8. Stage discharge relationship method is also known as ________ method.

a) Velocity Volume

b) Velocity Area

c) Distance Area

d) Displacement Momentum

View Answer

Answer: b
Explanation: Stage discharge relationship method is a direct method of computing a discharge in a stream by measuring velocity and area of flow. The place where such measurements are taken is known as velocity area station and the method is known as the velocity area method.

9. Velocity in a river flow can be calculated by using _________

a) By current meter

b) By emperical formulae

c) By infiltration method

d) By hydrograph

View Answer

Answer: a
Explanation: The velocity flow at any point in an open channel or in a river can be most accurately and conveniently determined by a mechanical device called current metre in this device the velocity of flow can be read from rating table.

10. Which of the following method is not used in measuring the velocity of a stream?

a) By floats

b) By rod float

c) By hydrograph

d) By colour

View Answer

Answer: c
Explanation: Hydrograph is a method of estimation of runoff. While the rest of the methods used in measuring the velocity of a stream/ river or canal. Hydrograph is a graph which shows the variations of discharge with respect to time.

11. The maximum flood discharge is also known as ___________

a) Peak flow

b) Maximum flow

c) Peak discharge

d) Peak flood

View Answer

Answer: a
Explanation: The maximum rate of discharge during a period of runoff, which is caused by a storm, is called a peak flow maximum flood discharge. Estimation of maximum flood discharge is a first step in planning for flood regulation.

12. Which of the following method is used to estimate maximum flood discharge?

a) By travelling screen

b) By current meter

c) By physical indication of past floods

d) By salt velocity

View Answer

Answer: c
Explanation: The results obtained by the physical indication of past floods methods are somewhat reliable. By oral enquiry in the villages situated on the banks of the river, the maximum water level attained in the past 35 years can be obtained. But this method is out-dated.
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13. ________formula is used only in southern India for calculating maximum flood discharge.

a) Dickens

b) Ryve's

c) Lacey's

d) Francis

View Answer

Answer: b
Explanation: Ryve's (1884) formula is used only in Southern India.
$Q = C(A)^{2/3}$.
The coefficient "C" depends on the maximum intensity of rainfall and other factors such as shape slopes exedra of the catchment.

14. A catchment area of 30.5 km^2 is situated in Central India calculate the maximum discharge coming from the catchment area.

a) 253.08 cumecs

b) 341.06 cumecs

c) 457.88 cumecs

d) 485.66 cumecs

View Answer

Answer: a
Explanation: As the catchment area is situated in central India. Dicken's formula is suitable and a maximum value of Dickens Coefficient is taken as 19.5
$Q = CA^{3/4}$
$Q = 19.5 \times (30.5)^{3/4}$
Q = 253.08 cumecs.

15. If the catchment area is situated in north India, then what is the flood coefficient?

a) 10.45

b) 11.37

c) 12.6

d) 19.4

View Answer

Answer: b
Explanation: Dicken's formula (1865)

Region	Value of C
North India	11.37
Central India	11.77 – 19.28
Western India	22.04

Polar Moment of Inertia

1. The moment of inertia of a plane area with respect to an axis _____________ to the plane is called a polar moment of inertia.

a) Parallel

b) Perpendicular

c) Equal

d) Opposite

View Answer

Answer: b
Explanation: The moment of inertia of a plane area with respect to an axis perpendicular to the plane of the figure is called a polar moment of inertia with respect to a point, where the axis intersects a plane.

2. What are the units of Polar modulus?

a) mm^3

b) mm^2

c) mm

d) mm^4

View Answer

Answer: a
Explanation: The ratio of polar moment of inertia (J) to the radius of section(R) is known as polar modulus or torsional section modulus. Its units are mm^3.

3. What is the polar modulus for solid shaft?

a) $\pi/16\ D^2$

b) $\pi/12\ D^3$

c) $\pi/\ 16\ D^3$

d) $\pi/16\ D$

View Answer

Answer: c
Explanation: For solid shaft $Z = J/R = \pi/32 \times D^4/\ D/2$.
$Z = \pi/16\ D^3$.

4. Calculate the polar moment of inertia for a solid circular shaft of 30 mm diameter.

a) $76m^4$

b) $79.5m^4$

c) $81m^4$

d) $84m^4$

View Answer

Answer: b
Explanation: Diameter of the shaft = 30 mm
Polar moment of inertia = $J = \pi/32 \times (30)^4\ mm^4$
$J = 79.52\ m^4$.

5. A hollow shaft outside diameter 120 mm and thickness 20 mm. Find polar moment of inertia.

a) $16.36 \times 10^6\ mm^4$

b) $18.45 \times 10^6\ mm^4$

c) $21.3 \times 10^6\ mm^4$

d) $22.5 \times 10^6\ mm^4$

View Answer

Answer: a
Explanation: For hollow circular shaft, outside diameter = 120 mm; d = 120-2×20 = 80 mm
the polar moment of inertia = $\pi/32 \times (120^4 - 80^4)$.
$J = 16.36 \times 10^6\ mm^4$.

6. Determine the maximum flood discharge from a catchment area of 40.25 km2 and it is situated in the Western Ghats.

a) 350 cumecs

b) 375 cumecs

c) 400 cumecs

d) 425 cumecs

View Answer

Answer: c
Explanation: Since the catchment area is situated in the Western Ghats, the formula best suited is Dicken's formula and the coefficient of Dicken's may be taken as 25.
$Q = CA^{3/4}$
$Q = 25\times(40.25)^{3/4}$
Q = 400 cumecs.

7. Which of the following is known as "under sluices"?

a) Scouring Sluices

b) Divide wall

c) Fish ladder

d) Head Regulator

View Answer

Answer: a
Explanation: The openings provided in a body wall of the weir almost at the bed level of the river are known as scouring sluices. These are also known as under sluices.

8. _______ provides straight approach to the scouring sluices.

a) Head regulator

b) Silt Excluder

c) Divide wall

d) Guide banks

View Answer

Answer: c
Explanation: A divide wall is a long solid wall constructed perpendicular to the axis of weir. It provides a straight approach to the scouring sluices. By preventing the formation of cross currents, it protects the body wall of weir.

9. __________ is provided for the easy movement of fish from upstream to downstream.

a) Fish ladder

b) Silt excluder

c) Marginal bunds

d) Marginal embankments

View Answer

Answer: a
Explanation: A passage provided just by the side of a divide wall for the movement of fish from upstream to downstream or vice versa is known as a fish ladder.

10. __________ is used as measuring device.

a) Head regulator

b) Divide wall

c) Cross regulator

d) Scouring sluices

View Answer

Answer: a
Explanation: A structure constructed at the head of the canal to regulate the supply of water into the canal is called “Head Regulator”. The functions:
i. It is used as a measuring device.
ii. It controls the entry of silt into the canal.

11. ___________ is provided to prevent the river from outflanking the work.

a) Guide banks

b) Marginal bunds

c) Silt excluder

d) Divide wall

View Answer

Answer: a
Explanation: Guide banks are provided on either side of the diversion head works in alluvial soils for a smooth non -tortuous approach to the diversion head works and prevent the river from outflanking the work.

12. _____________ are provided to protect the land and property with is likely to be submerged.

a) Weir

b) Divide wall

c) Marginal bunds

d) Fish ladder

View Answer

Answer: c
Explanation: Marginal Bunds or marginal embankments are provided on either bank of the river upstream side of diversion head works in alluvial soils in order to protect the land and property which is likely to be submerged during ponding of water during floods.
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13. __________ is provided to reduce the kinetic energy of falling water in weir.

a) Body wall

b) Curtain walls

c) Downstream apron

d) Shutter

View Answer

Answer: c
Explanation: The downstream apron is a concrete bed which is provided on the downstream side of a weir in order to reduce the kinetic energy of falling water. It should have sufficient thickness to resist uplift pressure.

14. Curtain walls are provided to increase _________

a) Creep depth

b) Creep area

c) Creep length

d) Creep volume

View Answer

Answer: c
Explanation: Curtain walls are provided under the upstream and downstream apron at the ends. We are provided to increase the length of creep and thereby to reduce exit gradient.

15. Which of the following are also known as upstream and downstream piles?

a) Talus on upstream and downstream

b) Curtain walls on upstream and downstream

c) Solid apron on upstream and downstream

d) Shutters on crest of weir

View Answer

Answer: b
Explanation: Curtain walls are provided especially under the upstream and downstream aprons at the respective ends. They are also called as upstream and downstream piles. The length of the curtain wall depends on the nature of subsoil.
Polar Modulus and Torsional Rigidity

1. A circular shaft of diameter 30 mm is tested under torsion the gauge length of test specimen is 300 mm. A torque of 2kNm produces an angle twist of 1°. Calculate CJ.

a) 0.432×10^6 N/mm^2

b) 0.324×10^6 N/mm^2

c) 0.46×10^6 N/mm^2

d) 0.532×10^6 N/mm^2

View Answer

Answer: a
Explanation: Angle of twist = 1° = π/180 radians.
Polar moment of inertia = $\pi/32 \times 30^4$mm^4.
To find CJ: T/J =C× twist angle
C = Tl/J×twist angle = $2\times10^6 \times300 / \pi/32 \times 30^4mm^4\times \pi/180$.
C = 0.4323×10^6 N/mm^2.

2. ___________ has perfect control on river flow.

a) Barrage

b) Weir

c) Marginal bunds

d) Guide banks

View Answer

Answer: a
Explanation: Barrages are much more costly than weirs. Gates are raised off the high flood to pass floods. They have perfect control of the river flow.

3. When the gross length is more than 6 metres between the face of abutment it is called as _________

a) Cause way

b) Bridge

c) Culvert

d) Cassion

View Answer

Answer: b
Explanation: When the gross length is more than 6 m between the faces of abutment measured at right angles is called a bridge. If a bridge supports a road way over a railway then it is called Road over a bridge.

4. The minimum straight approach provided on either side of bridge is ____________

a) 12 m

b) 15 m

c) 20 m

d) 22 m

View Answer

Answer: b
Explanation: The bridge site should be far away from the confluence of tributaries as far as possible the straight approaches are to be provided on either side of the bridge for at least 15m.

5. _________ should be taken below the deepest scour level.

a) Foundation

b) Sub structure

c) Structure

d) Parapet

View Answer

Answer: a
Explanation: Foundations to be provided for approaches abutments, piers etc., by considering the water in the river, sub soil conditions etc., a foundation should be taken below the deepest scour level.

6. ____________ formula is used for calculating the depth of the foundation.

a) Gordon's

b) Rankine's

c) WH Smith's

d) Falcon

View Answer

Answer: b
Explanation: Rankine's formula is used for calculating the depth of the foundation.
h=P/w × (1-sin/1+sin). Minimum depth is restricted to 90 cms.

7. ________ foundation is used when the depth of water is more.

a) Pile

b) Caisson

c) Raft

d) Spread

View Answer

Answer: b
Explanation: The caisson foundation is used when the depth of water is more. The spread Foundation is used when good hard soil is available at shallow depth.

8. ______________ foundation is used when bed soil is soft.

a) Raft

b) Pile

c) Spread

d) Well

View Answer

Answer: b
Explanation: Pile foundation is adopted when the bed soil is soft and hard soil is available at great depth and also the well foundation is adopted when river bed having sand and good soil is available at a reasonable depth.

9. The intermediate support of a bridge superstructure is called as ____________

a) Abutment

b) Pier

c) Wing wall

d) Approach

View Answer

Answer: b
Explanation: The intermediate support of bridge superstructure for a multi span bridge is called pier.
Functions:
i. To divide the total length of bridge into suitable spans.
ii. To distribute the load from the superstructure of the bridge.

10. ____________ piers are adopted for well foundations.

a) Masonry

b) RCC

c) Dumb bell

d) Pile bent

View Answer

Answer: c
Explanation: Dumb-bell piers are light in weight as compared to solid piers. These piers are suitable when well foundations are adopted. It consists of two columns connected by web for the full height.

11. ________ piers are used, when the height of pier is large as in case of viaducts, fly overs.

a) Column Bent

b) Pile bent

c) Trestle bent

d) Abutment pier

View Answer

Answer: c
Explanation: It consists of vertical, horizontal and diagonal members. Trestle bents may be of steel or concrete. These piers are suitable when the height of pier is large as in case of viaducts.

12. The projection of the piers on the upstream side is known as _________

a) Cut waters

b) Ease waters

c) Sharp waters

d) Para waters

View Answer

Answer: a
Explanation: The projection of the piers on the upstream side is known as cut waters. The cut waters are provided for easy passage of water. The shape may be triangular, semi-circular & parabolic etc.
advertisement

13. The end support of a bridge is __________

a) Pier

b) Abutment

c) Wing wall

d) Approach

View Answer

Answer: b
Explanation: The end support of a bridge superstructure is known as an abutment. The functions of abutment are
i. To retain the earth filling of approaches
ii. To finish up the bridge with necessary approaches.

14. The projection of the pier on the downstream side is known as ________

a) Ease water

b) Cut water

c) Bridge pier

d) Dumb pier

View Answer

Answer: a
Explanation: The projection of the pier on the downstream side is known as “ease waters”. They prevent the formation of eddies and their scouring effect.

15. ____________ piers are suitable when foundations are of steel cylinder caisson type.

a) Masonry

b) Trestle bent

c) Cylindrical

d) Pile

View Answer

Answer: c
Explanation: Cylindrical piers are made of mild steel filled with concrete and connected by horizontal and diagonal steel bearings. These are suitable when foundations of Steel cylinder caisson type.

[Combined Bending and Torsion]

1. A solid shaft of circular in section is subjected to torque which produces maximum shear stress in a shaft.

Calculate the diameter of the shaft.

a) $(16T/\pi f)^{3/2}$

b) $(16f/\pi T)^{1/2}$

c) $(16f/\pi)^{1/2}$

d) $(\pi T/16f)^{1/2}$

View Answer

Answer: a
Explanation: From torsional equation
$T/J = f/R$
$T = f.Z$
$T = f\times\pi/16d^3$.
$D= (16T/\pi f)^{3/2}$.

2. When two dissimilar shafts are connected together, then the shaft is ___________

a) Integrated shafts

b) Composite shafts

c) Differential shafts

d) Combined shafts

View Answer

Answer: b
Explanation: When two dissimilar shafts are connected together to form one shaft then the shaft can be termed as composite shaft.

3. ___________ torque occurs along with maximum shear stress due to combined bending and torsion.

a) Equipment

b) Coaxial

c) Biaxial

d) Lateral

View Answer

Answer: a
Explanation: Equipment torque is the twisting moment which acts along producing maximum shear stress due to the combined bending as well as torsion.

4. When a shaft is subjected to pure twisting then the type of stress developed is _________

a) Bending

b) Axial

c) Shear

d) Normal

View Answer

Answer: c
Explanation: Shear stress is produced when the shaft is subjected to pure twisting (torsion). The shear stress due to twisting moment is zero at the axis of the shaft.

5. The torque which produces unit twist per unit length is _________

a) Torsional rugosity

b) Torsional rigidity

c) Torsional viscosity

d) Torsional mean radius

View Answer

Answer: a
Explanation: The product of shear modulus(C) and polar moment of inertia (J) is called torsional rigidity. Torsional rigidity produces a twist of 1 radian in a shaft of unit length.

6. The level of top of weir can be termed as __________

a) Talus

b) Curtain walls

c) Crest

d) Shutter

View Answer

Answer: c
Explanation: The level of the top of weir is known as a crest. The shutters are provided on the crest and can be raised or laid flat during the time of floods.

7. ________ possesses less silting and scouring.

a) Weir

b) Barrage

c) Dams

d) Reservoir

View Answer

Answer: b
Explanation: The barrage is a low obstructive barrier constructed across the river. There will be less silting and better control over the levels due to low set crest.

8. In __________ there will be no means for silt disposal.

a) Weir

b) Barrage

c) Reservoir

d) Dams

View Answer

Answer: a
Explanation: The weir may be defined as a solid obstruction/wall built across the river to raise the water level. Raised crest causes silting at upstream and there is no means silt disposal.

9. _________ is a pure water pressure.

a) Uplift

b) Percolation

c) Scour

d) Flood bank

View Answer

Answer: a
Explanation: Uplift occurs when pore water pressure under a structure or a low permeability confining layer becomes larger than the mean overburden pressure.

10. __________ causes of uplift of structure.

a) Percolation

b) Scour

c) Critical Velocity

d) Slope Failure

View Answer

Answer: a
Explanation: The effect of percolation on an irrigation structure like a weir to cause uplift pressure on the structures and topple the structure at any moment.

11. ________ protects the weir from erosive forces during floods.

a) Talus

b) Curtain walls

c) Shutter

d) Upstream solid apron

View Answer

Answer: d
Explanation: Upstream solid apron is a concrete bed which is provided on the upstream side of weir to protect the weir from erosive forces during floods. The length of apron depends upon maximum discharge of the river.

12. Gross storage – Dead storage is _______

a) Live storage

b) Virtual storage

c) Excessive storage

d) Free storage

View Answer

Answer: a
Explanation: It is also called as available or effective storage. It is the difference between gross storage and dead storage. It is the amount of water available from FRL to the sill of the lowest sluice.
advertisement

13. Which of the following is not sound proof?

a) G I sheets

b) A C sheets

c) PVC sheets

d) Fabric sheets

View Answer

Answer: a
Explanation: Galvanised iron sheets are commonly used as a roofing material. These are very durable and fire proof. The main disadvantage is they are not sound proof.

14. Which of the following is not affected by temperature?

a) Fabric sheets

b) G I sheets

c) AC sheets

d) Flat roofs

View Answer

Answer: c
Explanation: Asbestos cement sheets are cheaper in the initial cost. They are fire resisting. They are heavy in weight and they are not affected by temperature.

15. Which of the following possess good insulation properties?

a) Battened roofs

b) Wooden roofs

c) Jack arch roofs

d) Flat roofs

View Answer

Answer: d
Explanation: Flat roofs are easier in construction and maintenance. A flat roof is more stable against high wards. It has a better architectural appearance and it has good insulation properties.
[Power of Shaft]

1. Calculate the power transmitted in the shaft at 150 rpm. Take torque as 9000Nm.

a) 140 kW

b) 150 kW

c) 160 kW

d) 175 kW

View Answer

Answer: a
Explanation: To find power transmitted (P) is $P = 2 \pi N T / 60$ watts.
$P = 2 \pi \times 150 \times 9000 / 60$
$P = 140$ kW.

2. Which of the following is not a cross drainage work?

a) Aqueduct

b) Head regulator

c) Super passage

d) Level crossing

View Answer

Answer: b
Explanation: The head regulator is hydraulic structure constructed at the head of a canal system where it takes off from a reservoir behind a weir or a dam. It is used as a measuring device.

3. Stucco is a type of __________

a) Varnishing

b) Distempering

c) Plastering

d) Whitewashing

View Answer

Answer: c
Explanation: Stucco is the name given to a decorative type of plaster, which provides an excellent finish like that with marble's lining.

4. The thickness of cement plaster should not be more than ________

a) 15 mm

b) 12 mm

c) 16 mm

d) 20 mm

View Answer

Answer: b
Explanation: The cement plaster is applied in one or two coats. The surface is polished with the trowel or iron float. The thickness of the coat should not be more than 12 mm.

5. __________ mm thick plastering is done for stone masonry.

a) 10 mm

b) 15 mm

c) 18 mm

d) 20 mm

View Answer

Answer: d
Explanation: Normally 12 mm thick plastering is done for brick masonry and 20 mm thick plastering is done for the stone masonry. The plastered surface is then cured by sprinkling water over the surface for one or two weeks.

6. The thickness of lime plaster varies from _______ to ________ mm.

a) 15 – 20 mm

b) 12 – 15 mm

c) 18 – 25 mm

d) 20 – 25 mm

View Answer

Answer: d
Explanation: The proportioning of the ingredients of lime plaster is adapted according to a number of coats to be applied. The thickness of lime plaster varies from 20 to 25 mm.

7. Which of the following plastering is widely adopted in rural areas?

a) Stucco Plastering

b) Mud plastering

c) Lime plastering

d) Asphalt plastering

View Answer

Answer: b
Explanation: Mud plastering is done on the walls of temporary Sheds and widely adopted in rural areas. The Plaster is evenly dashed against the wall with a wooden float. After 24 hours the surface is tapped.

8. Which of the following blasters contains pulverized alum?

a) Water proof plaster

b) Plaster on lathe

c) C plaster

d) Marble plaster

View Answer

Answer: a
Explanation: Waterproof plaster is made by mixing 1 part of cement, 2 parts of sand and pulverized alum at the rate of 120 Newton per metre and in the water to be used.

9. Which of the following is known as" laying trowel"?

a) Float

b) Gauge trowel

c) Floating Rule

d) Skimming float

View Answer

Answer: a
Explanation: The tool which is used to spread the mortar on the surface is known as float. It is also known as laying trowel. It is made of thin tempered Steel.

10. _________ is used to check the level of plastered surface.

a) Gauging trowel

b) Plumb bob

c) Floating Rule

d) Float

View Answer

Answer: c
Explanation: Floating rule is the tool which is used to check the level of plastered surface between the successive screeds.

11. Skimming float is ____________

a) Wooden float

b) Metalled float

c) Tempered steel float

d) Asbestos cement sheet

View Answer

Answer: a
Explanation: The wooden floor is known as the skimming float and it is used for final and finishing coat of plaster. The Plaster is evenly spread against the wall surface with a wooden float.

12. Which of the following is a defect in plastering?

a) Flaking

b) Scrap

c) Rust

d) Staining

View Answer

Answer: a
Explanation: Flaking is a defect in plastering. It is a formation of a very loose mass of plastered surface due to poor bond between successive coats. This is obtained due to poor workmanship.
advertisement

13. ________ is a process of mixing various constituents of plaster.

a) Grazing

b) Blistering

c) Gauging

d) Hacking

View Answer

Answer: c
Explanation: Gauging is defined as a process of mixing various constituents of plaster. It is to be done after the brick work had carried out to the best workmanship. Efflorescence can be removed to some extent of dry brushing.

14. The small projections of plaster are known as _________

a) Back

b) Dado

c) Dot

d) Hack

View Answer

Answer: c
Explanation: The small projections of plaster laid on the background are known as dots. These are laid for fixing of screeds. The size of the dots may be 15×15 cm.

15. _______ openings or indentations of corrugations in plaster.

a) Helms

b) Grains

c) Keys

d) Flake

View Answer

Answer: c
Explanation: Keys are the openings or indentations of corrugations on the background or surface of undercoat, to which plaster will form mechanical bond.
Composite Shaft

1. Calculate that torque, if the diameter of the shaft is 50 mm and revolutions @ 130 rpm. The maximum shear stress is 62.5 N/mm^2.

a) 1564 Nm

b) 1478 Nm

c) 1534 Nm

d) 1494 Nm

View Answer

Answer: c
Explanation: Diameter of shaft = 50 mm
Revolutions of shaft = 130 rpm.
Maximum shear stress = f= 62.5 N/mm^2.
$T = f \pi D^3 / 16$
$T = 62.5 \times 50^3 \times \pi / 16.$
T = 1534 Nm.

2. What is the example for a centrifugal pump?

a) Reciprocating pump

b) Suction pump

c) Rotodynamic pump

d) Delivery pump

View Answer

Answer: c
Explanation: Rotodynamic pumps have a rotating element through which as the liquid passes its angular momentum changes, due to which the pressure energy of the liquid is increased. The centrifugal pump is a rotodynamic pump.

3. Reciprocating pump is an example of ___________

a) Positive displacement pump

b) Delivery pump

c) Suction pump

d) Rotodynamic pump

View Answer

Answer: a
Explanation: Positive displacement pumps are those pumps in which the liquid is sucked and then it is pushed to the thrust exerted on it by a piston. The most common example of the positive displacement pump is the reciprocating pump.

4. _____ is the difference between theoretical discharge and the actual discharge of the pump.

a) Crank

b) Hook

c) Slip

d) Centile

View Answer

Answer: c
Explanation: c
Explanation: Slip of a pump is defined as the difference between the theoretical discharge and actual discharge after pump.

5. ______ is a phenomenon by which the study and continuous flow of liquid are obstructed.

a) Slip

b) Separation

c) Air vessels

d) Knockage

View Answer

Answer: b
Explanation: Separation of reciprocating pump is that phenomenon by which the steady and continuous flow of liquid is affected by the presence of air and dissolved gases.

6. Negative slip occurs when the_______ is more than theoretical discharge.

a) Virtual discharge

b) Actual discharge

c) Mean discharge

d) Mode discharge

View Answer

Answer: b
Explanation: When the delivery valve opens before the suction stroke is completed, the actual discharge is more than the theoretical discharge. In such cases, the slip of the pump is known as a negative slip.

7. _____ slip occurs, when the delivery pipe is short and the suction pipe is long.

a) Positive

b) Critical

c) Negative

d) Zero

View Answer

Answer: b
Explanation: The slip occurs when the delivery pipe is short and the suction pipe is long. The pump is running at high speeds as the delivery valve open before a suction stroke is completed, the slip of the pump is known as negative slip.

8. ________ reduces the possibility of separation.

a) Air vessels

b) Casing

c) Impeller

d) Vortex

View Answer

Answer: a
Explanation: An air vessel may be a closed chamber having the compressed air in a top portion and the water at the bottom. It reduces the possibility of separation and it ensures the pump to run at high speed.

9. If the absolute pressure falls below ___________ m, the pump prone to separation.

a) 3 m

b) 2 m

c) 1.5 m

d) 2.5 m

View Answer

Answer: d
Explanation: If the absolute pressure falls below 2.5 metres of water, the dissolved gases will be appearing in a liquid and continuous flow will be chocked. This phenomenon can be termed as separation.

10. The phenomenon of separation can also be known as ___________

a) Cavitation

b) Priming

c) Positive head

d) Pulsate

View Answer

Answer: a
Explanation: Separation is a phenomenon of obstructing the flow by the presence of dissolved gases when the

absolute pressure falls below 2.5 metres of water. This phenomenon of separation can also be known as knocking (or) cavitation in the reciprocating pump.

11. The work done against friction is reduced due to _____________

a) Impeller

b) Priming

c) Air vessel

d) Vortex

View Answer

Answer: c
Explanation: An air vessel is fitted to the suction and delivery pipes at a point close to the cylinder of a single acting reciprocating. The pump increases the length of the suction pipe and reduces the work done against friction.

12. Volute is a type of _____________

a) Delivery pipe

b) Casing

c) Impeller

d) Suction pipe

View Answer

Answer: b
Explanation: Casing is an airtight chamber covering the impeller. The different types of casing
i.Volute casing
ii.Vortex casing
iii.Casing with guide blades.
advertisement

13. ______ pumps, the torque is uniform.

a) Reciprocating pump

b) Suction pump

c) Delivery pump

d) Centrifugal pump

View Answer

Answer: d
Explanation: Centrifugal pump is used for lifting highly viscous liquids such as oils, muddy and sewage water, paper pulp etc. In centrifugal pump, torque is uniform and no air vessels are required.

14. What is the practical maximum suction lift in a reciprocating pump?

a) 3.5 m

b) 4.5 m

c) 5 m

d) 6.5 m

View Answer

Answer: d
Explanation: Reciprocating pump can handle only pure water or less viscous liquids free from impurities. It can be operated at low speeds only. The practical maximum section lift is 6.5 metres.

15. _____ pumps give a larger discharge.

a) Suction

b) Reciprocating

c) Centrifugal

d) Positive displacement

View Answer

Answer: c
Explanation: Centrifugal pump are an example of rotodynamic pump the basic principle of centrifugal pump is that "when a certain mass of liquid is rotated by an external force, then the centrifugal head is impressed which enables it to rise to a higher level". A centrifugal pump discharges a larger quantity when compared to other pumps.

Stresses in Frames – 1

1. _________ is a structure made up of several members connected to each other.

a) Frame

b) Form work

c) Strut

d) Caisson

View Answer

Answer: a
Explanation: Frame is a structure made up of several members riveted and welded together. The members of the frame are made in such a way that the form angle iron or channel sections.

2. A frame which is composed of members just sufficient to keep it in equilibrium, such frame is ___________

a) Redundant frame

b) Perfect frame

c) Imperfect frame

d) Deficient frame

View Answer

Answer: b
Explanation: A perfect frame is 1 for which the following equation is satisfied m = 2j-3.
A perfect frame is that which is composed of members just sufficient to keep it in equilibrium when loaded without any change.

3. In the equation m = 2j-3 ; the letter "j" stands for __________

a) Joists

b) Junctions

c) Joints

d) Jumble

View Answer

Answer: c
Explanation: In the equation m= 2j-3
Where, m = number of members
J = number of joints
"If this equation gets satisfied then the frame for which the equation has setup is perfect frame".

4. In statically determinate structures _______ is independent.

a) Shear force

b) Bending moment

c) Shear stress

d) Axial load

View Answer

Answer: b
Explanation: If conditions of equilibrium are sufficient to analyse the structure fully, then it is statically determinate structure. In this bending moment at a section is independent of the material of the components of the structure.

5. What is the splay provided in splayed wing walls?

a) 30°

b) 45°

c) 60°

d) 90°

View Answer

Answer: b
Explanation: Splayed wing walls permit smooth entry and exit of water under the bridge. The splay is usually provided at 45°. The weep holes are also provided.

6. The wing wall resembling the letter "U" in plan, is ___________

a) Return wing wall

b) Approach wing wall

c) Splayed wing wall

d) Straight wing wall

View Answer

Answer: a
Explanation: The return wing walls resemble the letter "U" in plan wing walls are parallel to the centre line of the bridge. It is used where rivers having steep and rocky banks and not subjected to the erosion of soil.

7. __________ coat develop resistant texture.

a) Prime coat

b) Seal coat

c) Tack coat

d) Open coat

View Answer

Answer: b
Explanation: Seal code is final coat lay over bituminous pavements which are not impervious. Seal coat develops skid resistant texture and they provide better riding surface.

8. Which of the following roads (pavements) does not develop any corrugations?

a) Bituminous

b) Concrete

c) Water bound macadam

d) Asphalt

View Answer

Answer: b
Explanation: Concrete road is suitable even under poor sub grades. It is not develop any corrugations and its maintenance cost is low.

9. Which of the following is the weakest part in the railway track?

a) Rail joint

b) Plates

c) Spikes

d) Lugs

View Answer

Answer: a
Explanation: The joint which is made between two rails together with two fish plates and four fish bolts to form an expansion gap of 1.5 to 3 mm. Rail joint is the weakest part in the railway track.

10. Sabotage problem is eliminated in ________

a) Round spike

b) Dog spike

c) Screw spike

d) Polar spike

View Answer

Answer: c
Explanation: Holding capacity of rails to sleepers is more and costly. Hence screw spike is used in driving and extraction. Though it is costly and time consuming, the sabotage problem is eliminated due to screw spike.

11. _________ are made of high carbon steel to withstand heavy stresses.

a) Fish plates

b) Fish bolts

c) Spikes

d) Lugs

View Answer

Answer: b
Explanation: For each rail joint, four fish bolts are required to connect fish plates and rails together. Fish bolts are made of medium or high carbon steel to which stand heavy stresses.

12. For each sleeper ________ pandrol clips are used.

a) 3

b) 2

c) 4

d) 5

View Answer

Answer: c
Explanation: Pandrol clip is made of silicon manganese spring steel bar of 20.6 mm diameter and heat treated. It exerts a toe load of 6.97 kN. For each sleeper, four pandrol clips are used.
advertisement

13. The Wheels of Rolling stock have slope ________

a) 1 in 10

b) 1 in 15

c) 1 in 20

d) 1 in 30

View Answer

Answer: c
Explanation: The wheels of rolling stock are made in the shape of a frustum of a cone having a slope of 1 in 20 is known as coning of wheels. The objective of coning of wheels is to prevent lateral movement of trains in straight track.

14. ________ are transverse ties on which the rails are laid.

a) Lugs

b) Sleepers

c) Spikes

d) Clips

View Answer

Answer: b
Explanation: Sleepers are transverse ties on which the rails are laid and transfer the load from rails to ballast. The main function of a sleeper is to provide a firm and even support to rails.

15. _______ permits track circuiting.

a) Clips

b) Rails

c) Spikes

d) Sleepers

View Answer

Answer: d
Explanation: The sleepers should be capable of resisting vibrations and shocks due to fast moving trains. The fastenings used to fix rails to sleepers should be minimum. The sleepers should permit track circuiting.

Stresses in Frames – 2

1. The Velocity at which flow changes from viscous to turbulent is called __________ velocity.

a) Critical

b) Frictional

c) Relative

d) Nominal

View Answer

Answer: a
Explanation: A fluid motion is always subjected to a certain resistance. In reality, this resistance is mainly due to sliding. The velocity at which the flow changes from a viscous flow to turbulent flow is called critical velocity.

2. Flow in circular pipes will be turbulent is Reynolds number is _________

a) < 2800

b) > 2800

c) = 2800

d) ~ 2800

View Answer

Answer: b
Explanation: Reynold's number (Re) = Vd/v
V = Mean velocity of flow in pipe
d = Diameter of pipe
v = Kinematic viscosity of liquid
Flow in circular pipe will be turbulent if Reynolds number is greater than 2800.

3. ______ number is the ratio between inertia and viscous forces.

a) Lamina's

b) Parker's

c) Macadam's

d) Reynold's

View Answer

Answer: d
Explanation: Professor Reynold's deduced from his experiments that at lower velocities the liquid flow was a laminar and at higher velocities, the flow was turbulent. It is a dimensionless number as it is the ratio between inertia and viscous forces.

4. The frictional resistance is _______ to the surface area of contact.

a) Inversely proportional

b) Directly proportional

c) Equal

d) Not equal

View Answer

Answer: b
Explanation: The frictional resistance is directly proportional to the surface area of contact. The frictional resistance is independent of the pressure and where is considerably with temperature.

5. _____________ flow the liquid particles move along straight parallel paths.

a) Steady

b) Unsteady

c) Laminar

d) Turbulent

View Answer

Answer: c
Explanation: Flow in circular pipes will be laminar if the Reynolds number is less than 2000. The laminar flow is a type of flow in which the liquid particles move along straight parallel path in layers or laminates.

6. The ___________ resistance is independent of the nature of surface contact.

a) Frictional

b) Skid

c) Shear

d) Coupling

View Answer

Answer: a
Explanation: When the liquid flows at a velocity that is less than the critical velocity. A thin stationary film of the liquid is formed on a supporting surface. This is a reason that the frictional resistance is independent of the nature of surface of contact.

7. Calculate the specific weight of oil. If the specific gravity is 0.95. Take specific weight of water is 1000 kg/m^3.

a) 750 kg/m^3

b) 850 kg/m^3

c) 950 kg/m^3

d) 1250 kg/m^3

View Answer

Answer: c
Explanation: The specific gravity (S) = specific weight of oil / specific weight of
Specific weight of oil = S × specific weight of water
Specific weight of oil = 0.95 × 1000
= 950 kg/m^3.

8. In _______ liquid flows under atmospheric pressure.

a) Pipe flow

b) Open channel

c) Stream

d) Aqueduct

View Answer

Answer: b
Explanation: Liquid flows under atmospheric pressure in an open channel due to its slope of the channel. There must be some slope in the bed of the channel to flow to take place.

9. The energy gradient line is _______ to drop in bed, in an open channel.

a) Equal

b) Parallel

c) Perpendicular

d) Unequal

View Answer

Answer: a
Explanation: For uniform flow in an open channel the drop in the energy gradient line is equal to drop in bed. Flows in irrigation channels, streams and rivers are some examples of open channel flow.

10. Aqueduct is an example of __________ channel.

a) Natural

b) Prismatic

c) Non prismatic

d) Artificial

View Answer

Answer: d
Explanation: An artificial channel is the one which is built artificially for some specific purpose such as irrigation water supply and water power development etc. The examples include canals, drainage gutters and aqueducts.

11. Rectangular channel is __________ channel.

a) non Prismatic

b) Prismatic

c) Natural

d) Artificial

View Answer

Answer: b
Explanation: A channel is said to be prismatic if the cross-section is uniform and the bed slope is constant throughout its length. The rectangular channel comes under Prismatic channel.

12. Expand RVF __________

a) Rapid Vary Fluid

b) Rise in Virtual Flow

c) Rapidly Varied flow

d) Rapidly Viscous flow

View Answer

Answer: c
Explanation: RVF stands for Rapidly Varied Flow. If the depth floor changes abruptly over a comparatively shorter distance, the flow is characterised as rapidly varied flow. Typical examples of rapidly varied flow are hydraulic jump and hydraulic drop.
advertisement

13. Froude number is the ratio of inertial force to the __________ force.

a) Shear

b) Gravity

c) Uplift

d) Viscous

View Answer

Answer: b
Explanation: The ratio of the inertia force and gravity force is known as the Froude number. It is denoted by Fr.
Fr = V/(gD)1/2.

14. For super critical flow, Fr __________ 1.

a) >

b) <

c) =

d) ~

View Answer

Answer: a
Explanation: Froude number the ratio of inertial force to the gravity force.
Fr = V/(gD) 1/2
For supercritical flow, Fr > 1.

15. Strut is a tension member.

a) True

b) False

View Answer

Answer: b
Explanation: Strut is the member of a structure any position carrying the compressive load. It may be horizontal, inclined or even vertical.
Thin Cylinders

1. If the thickness of plate is negligible when compared to the diameter of the cylindrical, then it is called ___________

a) Thick cylinder

b) Thin cylinder

c) Hoop cylinder

d) Circumferential cylinder

View Answer

Answer: b
Explanation: The thickness of plate is negligible when compared to the diameter of the cylindrical shell, and then it can be termed as a thin cylinder. The radius stress in the cylinder walls is negligible.

2. In thin cylinders, the thickness should be _____________ times of internal diameter.

a) 1/20

b) 1/15

c) 1/30

d) 1/40

View Answer

Answer: a
Explanation: In thin shells, the stress distribution over the thickness of the material is assumed to be uniform and the wall thickness is equal to or less than 1/ 20 of the internal diameter.

3. Oil tanks, steam boilers, gas pipes are examples of ______________

a) Thick shells

b) Thin cylinders

c) Hoop cylinders

d) Longitudinal cylinders

View Answer

Answer: b
Explanation: In thin cylindrical shells, the stresses are uniformly distributed throughout the wall. The type of stresses developed in thin cylinders is hoop stress and longitudinal stress. Ex: water supply mains, oil tanks, steam boilers and gas pipes.

4. In __________ shells, the stress distribution is not uniform over the thickness of the material.

a) Thick

b) Thin

c) Hoop

d) Circumferential

View Answer

Answer: a
Explanation: A cylinder in which the wall thickness is greater than 1 / 20 of internal diameter it is called the thick cylinder.
t>d/20. In thick shells, the stress distribution is not uniform over the thickness of the material.

5. Hydraulic radius is denoted by __________

a) T

b) A

c) R

d) N

View Answer

Answer: c
Explanation: Hydraulic radius is the ratio of wetted area to the wetted perimeter. It is also known as hydraulic mean depth. It is denoted by "R".
R = A/P.

6. Hydraulic depth is a ratio of wetted area to ______

a) Bottom width

b) Top width

c) Diameter

d) Radius

View Answer

Answer: b
Explanation: Hydraulic depth is the ratio of wetted area to the top with (T). It is denoted by D
D = A/T.

7. What is the hydraulic depth (D) of a rectangular section?

a) y

b) 1/3 y

c) y^2

d) y/5

View Answer

Answer: a
Explanation: The hydraulic depth (D) of a rectangular section is y.

Section	Hydraulic depth (D)
Rectangle	y
Trapezoid	(B+Zy)y / B+2zy
Triangle	½ y

8. In manning's formula, $V = 1/n \times m^2/3 \times i^{1/2}$. N stands for ___________

a) Coefficient of viscosity

b) Coefficient of rugosity

c) Coefficient of runoff

d) Coefficient of friction

View Answer

Answer: b
Explanation: In 1889, manning presented a formula according to which the mean velocity of uniform flow in a channel is $V = 1/n \times m^{2/3} \times i^{1/2}$.
Where n = coefficient of rugosity.

9. What is the coefficient of rugosity for brick lined surface?

a) 0.011

b) 0.012

c) 0.015

d) 0.013

View Answer

Answer: c
Explanation: The coefficient of rugosity for brick lined surface is 0.015.

Channel Surface	Coefficient of rugosity (n)
Asbestos cement	0.011
Brick	0.015
Cast Iron	0.012
Galvanised Iron	0.016

10. Most economical section is also called as __________

a) Most active section

b) Most effective section

c) Most efficient section

d) Superior section

View Answer

Answer: c
Explanation: A channel is said to be the most economical if it gives the maximum discharge under given cross-sectional area, bottom slope and roughness. The most economical section is also known as the most efficient section.

11. For most economical section __________ should be minimum.

a) P

b)A

c) R

d)N

View Answer

Answer: a
Explanation: A channel discharges larger if the hydraulic radius is maximum. The hydraulic radius will be maximum when the wetted perimeter is minimum for a given area. Hence, for most economical section the wetted perimeter should be minimum.

12. A rectangular channel has cross sectional area of 50 m^2. If the channel section is to be most economical calculate the depth. Take B = 10m.

a) 10 m

b) 5 m

c) 8 m

d) 12 m

View Answer

Answer: b
Explanation: Let y be the depth of flow of the channel. For most economical section y = B/2.
Cross-section area of flow A = By
y= 50/10
y= 5 m.
advertisement

13. __________ are used to change the water level in a canal.

a) Sluice gates

b) Lock gates

c) Check gates

d) Scour gates

View Answer

Answer: b
Explanation: Gates which are used to change the water level in a canal or a river are known as lock gates. If a canal or a river has a vertical fall at any section, it is necessary to raise or lower the water level in order to transfer the boat from upper water level to lower one.

14. The flow of water is controlled in hydraulic structures by _____________

a) Sluice gates

b) Check gates

c) Lock gates

d) Drain gates

View Answer

Answer: a
Explanation: In hydraulic structures, the openings are provided to carry water from its storage place to place of utilisation. The flow of water through such openings is controlled by means of sluice gates.

15. The units of discharge are ______________

a) m/s

b) m^2/s

c) m^3/s

d) m

View Answer

Answer: c
Explanation: The volume of liquid flowing through any section or channel per unit time is called discharge or rate of flow. It is expressed in m^3/s.
It is denoted by "Q".
1 cumec = 1000 litres/sec.
Thin Cylinder Internal Pressure

1. The stress acts tangential to circumference is called _______ stress.

a) Hoop

b) Fluid

c) Longitudinal

d) Yield

View Answer

Answer: a
Explanation: The stress which is developed in the walls of the cylinder due to internal fluid pressure and which acts tangential to circumference is called hoop stress or circumferential stress.

2. The hoop stress is ______________ along the x axis.

a) Tensile

b) Parabolic

c) Compressed

d) Transverse

View Answer

Answer: a
Explanation: Hoop stress is also known as circumferential stress and it is tensile along x-axis. The total pressure along the diameter of the shell P = intensity of stress × Area.

3. The cylinder has a tendency to split up along ______________ due to circumferential stress.

a) Area

b) Radius

c) Diameter

d) Length

View Answer

Answer: c
Explanation: As a result of circumferential stress a cylinder has a tendency to split up along its diameter. Because of hoop stress, the failure is a longitudinal failure.

4. _____________ is half the circumferential stress.

a) Hoop stress

b) Longitudinal stress

c) Fluid stress

d) Transverse stress

View Answer

Answer: b
Explanation: Longitudinal stress is developed along the walls of the cylinder in the shell due to internal fluid pressure on the ends. The longitudinal stress is half the circumferential stress.

5. Which of the following is also known as axial stress?

a) Shear stress

b) Longitudinal stress

c) Bending stress

d) Hoop stress

View Answer

Answer: b
Explanation: The stress which is developed due to internal fluid pressure on the ends is known as longitudinal stress. As a result of longitudinal stress, the cylinder has a tendency to be turn away longitudinally. It is also known as axial stress.

6. The layers of wood wearing thickness from ____________ to __________ is called veneers.

a) 0.4 to 0.6 mm

b) 0.5 to 0.8 mm

c) 0.4 to 0.6 mm

d) 0.5 to 0.7 mm

View Answer

Answer: a
Explanation: The layers or slices of wood varying thickness from 0.4 to 0.6 mm or more are called veneers. They are obtained by rotating a log of wood against a sharp knife.

7. _____________ is used as decorative facings.

a) Plywood

b) Veneers

c) Ply ware

d) Battens

View Answer

Answer: b
Explanation: Veneers are used in construction where light weight, moderate strength, non shrinkage and non splitting properties are required. Veneers are used for decorative facings.

8. Which of the following is known as block board?

a) Batten board

b) Plywood

c) Fiber board

d) Veneer

View Answer

Answer: a
Explanation: The strips which are glued together between two veneers one on either side are known as batten boards. The board is made with 25 mm with strips. It is also known as block board.

9. Which of the following is also known as pressed woods?

a) Ply wood

b) Ply ware

c) Batten board

d) Fiber wood

View Answer

Answer: d
Explanation: The boards which are made by pressing the mixture of saw dust, fibres of wood and glue are known as fibre boards or pressed woods or reconstructed wood.

10. Which of the following boards are used in making partitions covering?

a) Lamin boards

b) Particle boards

c) Straw boards

d) Eco board

View Answer

Answer: a
Explanation: The laminated boards having a core of strips not exceeding 7 mm thickness are glued together between two or more veneers are called laminated boards. Laminated boards are used in making partitions covering, packing cases and for floor coverings.

11. _____________ boards are manufactured from sugarcane waste obtained from bagasse.

a) Eco board

b) Straw board

c) Lamin board

d) Particle board

View Answer

Answer: a
Explanation: Eco board is manufactured from sugarcane waste obtained from sugar factory known as "Bagasse". These bagasse balls are broken into required small size particles. These boards possess the following advantages:
i. These are durable
ii. They possess good strength and workability.

12. Plastic is a _____________ substance.

a) Eco friendly

b) Inorganic

c) Organic

d) Natural

View Answer

Answer: c
Explanation: The plastic is one of the recent engineering materials which are widely used. The plastic is an organic substance made up of natural or synthetic resins.
advertisement

13. Plastic possess tensile strength of _______________

a) 4.2 $tonnes/cm^2$

b) 5.6 $tonnes/cm^2$

c) 3.4 $tonnes/cm^2$

d) 4.8 $tonnes/cm^2$

View Answer

Answer: b
Explanation: Plastic can withstand wear and tear due to abrasion. The plastics are highly resistant to corrosion. They possess tensile strength about 5.6 tonnes per centimetre square (5.6 $tonnes/cm^2$).

14. ________ is an example of thermoplastic.

a) Shellac

b) Bakelite

c) Phenol formaldehyde

d) Urea formaldehyde

View Answer

Answer: a
Explanation: Thermoplastic softens by heating and hardens when cooled. This variety of plastic can be used by remoulding many numbers of times as required. The commercial forms of thermoplastic are shellac, vinyl plastics, and acrylic.

15. What is the minimum percentage of reinforcement provided in mild steel?

a) 0.12 % of gross area

b) 0.15 % of gross area

c) 0.18 % of gross area

d) 0.2 % of gross area

View Answer

Answer: b
Explanation: As per IS 456 – 2000,
0.12 % of gross area is required for HYSD bars [Tor steel] 0.15 % of gross area is required for mild steel.
Thin Cylinder Due to Hoop Stress

1. Which of the following stress can also be known as hoop stress?

a) Axial stress

b) Longitudinal stress

c) Fluid stress

d) Circumferential stress

View Answer

Answer: d
Explanation: Circumferential stress in the shell = f = Total pressure / resisting section
f = pdl/2tl
f = pd/2t.
Circumstantial stress can also be known as hoop stress.

2. A water main of 1.5 m diameter and 20 mm thick is subjected to an pressure of 1.5N/mm^2. Calculate the circumferential stress induced in the pipe.

a) 78.65 N/mm^2

b) 68.45 N/mm^2

c) 56.25 N/mm^2

d) 60.85 N/mm^2

View Answer

Answer: c
Explanation: Diameter of water main = 1500 mm and internal pressure = 1.5 N/mm^2
Thickness = 20 mm
Hoop stress = pd/2t = 1500 × 1.5/ 2× 20.
= 56.25 N/mm^2.

3. Which of the following method is also known as overhead irrigation method?

a) Drip Irrigation

b) Sprinkler

c) Contour

d) Check flooding

View Answer

Answer: b
Explanation: Sprinkler irrigation method is used where the soil is erodable type and high permeable. It is also known as overhead irrigation. The sprinkler method requires a large investment in installing.

4. The average diameter of particles of silt is ___________

a) 0.08mm

b) 0.002 mm

c) 1.2 mm

d) 0.011

View Answer

Answer: b
Explanation: The average diameter of particles of silt is 0.002 mm.

Group	Average diameter in mm
Sand	2 to 0.06 mm
Silt	0.06 to 0.002 mm
Clay	< 0.002 mm

5. pH is measured in _____

a) gram / litre

b) gram/cm

c) cusecs

d) cumecs

View Answer

Answer: a
Explanation: pH value in a chemical term which shows acidity or alkalinity of the matter. The pH value is a logarithm of the reciprocal of the hydrogen in concentration measured in gram per litre.

6. Soil moisture stress is defined as the sum of soil moisture tension and ______ pressure of soil solution.

a) Weed

b) Perforated

c) Osmatic

d) Uplift

View Answer

Answer: c
Explanation: The increase in the force caused by salts is called osmatic pressure. The soil moisture stress is defined as the sum of soil moisture tension and osmotic pressure of soil solution.

7. In coarse textured sandy soils, the field capacity can be achieved in _________

a) 1 to 3 days

b) 2 to 5 days

c) 3 to 7 days

d) 5 to 8 days

View Answer

Answer: a
Explanation: The moisture content held by soil after gravitational water has drained off from a saturated soil is called field capacity. In coarse textured soils, the field capacity can be achieved in 1 to 3 days.

8. Acid in the rain was first detected by ___________

a) Lacy Film

b) Angus smith

c) Graeme Robert

d) Mesh swann

View Answer

Answer: b
Explanation: The amount of acid which falls as towards earth with the rain water and snow is called acid rain. The acid in the rain water was detected for the first time by Robert Angus Smith in 1872.

9. _________ causes deterioration of buildings and monuments.

a) Acid rain

b) Green house effect

c) Global warning

d) Ozone layer depletion

View Answer

Answer: a
Explanation: Acid rain causes a number of harmful effects below pH 5.1. The effects are visible in the aquatic

system even at pH less than 5.5. It causes deterioration of buildings especially made of marble. It damages stone statues, metals and car finishes.

10. Expand CFC _________

a) Chlorofluorochloride

b) Carbonfluorochlorine

c) Chlorofluorocarbon

d) Cadmiumfluorocalcium

View Answer

Answer: c
Explanation: CFC stands for Chlorofluorocarbon. It is one of the major gases of the greenhouse. It is released from refrigerators, air conditioners etc.

11. ______ is mainly responsible for ozone depletion in the stratosphere.

a) CFC

b) MNC

c) ESC

d) FSC

View Answer

Answer: a
Explanation: Over last 450 million years, the earth had a natural sunscreen in the stratosphere called the ozone layer. This layer filters out harmful ultraviolet rays from the sunlight and the protects various life forms on the earth. CFC is mainly responsible for ozone depletion in the stratosphere.

12. Fossil fuels are example for ________

a) Exhaustible resources

b) Renewable resources

c) Non renewable resources

d) Inexhaustible resources

View Answer

Answer: b
Explanation: Non renewable resources lack the ability of recycling and replacement. The substances with a very long recycling time are also regarded to be non renewable resources. Ex: biological species, minerals &fossil fuels.
advertisement

13. Nuclear energy is __________

a) Renewable energy resource

b) Non renewable energy resource

c) Exhaustible resource

d) Inexhaustible resource

View Answer

Answer: b
Explanation: Non renewable energy resources mainly include fossil fuels and nuclear energy. The fossil fuels are found inside earth’s crust. The nuclear energy obtained through fission or fusion reaction which yields large amount of heat energy.

14. Geothermal Energy is __________

a) Renewable energy resource

b) Natural resource

c) Sustainable resource

d) Exhaustible resource

View Answer

Answer: a
Explanation: In some places, the heated water comes to the earth surface as hot springs. It can be used for heating water and buildings and for generating electricity. This is known as geothermal energy and it is a renewable energy resource.

15. The study of ecosystems is known as __________

a) Echography

b) Bibliograph

c) Ecology

d) Biology

View Answer

Answer: c
Explanation: Ecology deals with the study of organisms in their natural home interacting with their surroundings. Now ecology is often defined as the study of ecosystems.
Thin Cylinder Due to Longitudinal Stress

1. The longitudinal stress is ______ stress across the section.

a) Shear

b) Bending

c) Tensile

d) Compressive

View Answer

Answer: c
Explanation: The tendency of longitudinal stress in a cylinder is to turn away longitudinally. The longitudinal stress is tensile stress across the section.

2. The longitudinal stress in the shell is __________

a) pd/3t

b) pd/4t

c) pd/2t

d) pd/6t

View Answer

Answer: b
Explanation: As longitudinal stress is half the circumferential stress, then f = total pressure/ resisting section.
$f = p \times \pi/4\ d^2 / \pi\ d\ t$
$f = pd/4t$.

3. The ratio of hoop stress to maximum shear stress is __________

a) 2

b) 3

c) 4

d) 6

View Answer

Answer: c
Explanation: Maximum shear stress (q) = (hoop stress – longitudinal stress) / 2
= pd/8t
= pr/4t
The ratio of hoop stress to maximum shear stress is 4.

4. At any point on the circumference of the cylinder, the longitudinal and hoop stress are ________

a) Parallel

b) Equal

c) Orthogonal

d) Radial

View Answer

Answer: c
Explanation: At any point on the circumference of the cylindrical shell, the longitudinal (axial stress) and hoop stress(circumferential stress) are always orthogonal to each other.

5. Calculate the axial stress induced in the pipe is the water mean of 1.5 metres diameter and 20 mm thick is subjected to an internal pressure of 1.5 N/mm^2.

a) 28.125 N/mm^2

b) 35.675 N/mm^2

c) 46.785 N/mm^2

d) 67.845 N/mm^2

View Answer

Answer: a
Explanation: Longitudinal stress (axial stress) = pd / 4t.
f= 1.5 × 1500 / 4 × 20
f= 28.125 N/mm^2.

6. Saprotrophs are also known as __________

a) Detritus Feeders

b) Decomposers

c) Tertiary consumers

d) Omnivores

View Answer

Answer: a
Explanation: Saprotrophs feed on the parts of dead organisms, wales of living organisms and partially decomposed matter. They are also known as the detritivores. Termites, crabs etc. are the examples saprotrophs.

7. Energy flows through the ecosystem in the form of ___________ bonds.

a) C-C

b) N-N

c) O-O

d) F-F

View Answer

Answer: a
Explanation: Energy flows through the ecosystem in the form of carbon-carbon bonds when respiration occurs, the carbon-carbon bonds are broken and the carbon is combined with oxygen to form carbon dioxide.

8. Energy does not recycle.

a) True

b) False

View Answer

Answer: a
Explanation: Energy is neither created nor destroyed. All energy comes from the sun, and that the ultimate fate of all energy in ecosystem is to be lost as heat. Energy does not recycle.

9. _____________ is a network of food chain of different types of organisms.

a) Food web

b) Food network

c) Food system

d) Food cache

View Answer

Answer: a
Explanation: Food web is a network of food chains where different types of organisms are connected at different trophic levels. There are the number of options of eating and being eaten at each trophic level.

10. Ecological pyramids were first devised by ___________

a) Earnest Haeckel

b) Roger Federer

c) Charles Eltan

d) Smith Nell

View Answer

Answer: c
Explanation: An ecological pyramid is a graphic representation of an ecological parameter like a number of individuals. The ecological pyramids were first devised by British ecologist Charles Elton in 1927.

11. Which of the following is correct?

a) Phytoplankton-zooplanktons- fish

b) Zooplanktons -protozoan-fish

c) Grass- fish- zoo plankton

d) Zooplanktons- phytoplankton-fish

View Answer

Answer: a
Explanation: The sequence of eating and being eaten in an ecosystem is known as a food chain. Some of the common examples of the simple food chain are grass -grasshopper -frog- snake- hawk (grassland ecosystem). Phytoplankton-zooplanktons- fish (pond ecosystem).

12. Wholesome water is also known as __________

a) Palatable water

b) Quality water

c) Lethal water

d) Toxic water

View Answer

Answer: a
Explanation: Palatable water is the water that it is free from excessive temperature, colour, turbidity taste and odour. It is well aerated. The Wholesome water indicates palatable water.
advertisement

13. Rate of demand is also known as ___________

a) Domestic demand

b) Per capita demand

c) Commercial demand

d) Livestock demand

View Answer

Answer: b
Explanation: Rate of demand is the rate of water to be supplied per person per day it is expressed as litres per capita per day.
Per capita demand (or) rate of demand = Q/P×365 litres per day.

14. Water works are generally design with design period of ___________

a) 25 years

b) 30 years

c) 45 years

d) 50 years

View Answer

Answer:b
Explanation: Water supply projects are designed to serve our specific period of time after completion of the project. This time period is called a design period. The water works are generally designed with a design period of 30 years.

15. What is a design period for storage dam?

a) 45 years

b) 50 years

c) 60 years

d) 90 years

View Answer

Answer: b
Explanation: The design period for storage dam is 50 Years.

Item	Design period (years)
Storage dams	50

Infiltration works	30
Water treatment units	15
Raw water and Clear water conveying mains	30

Thin Cylinder Due to Longitudinal Stress on Surface of Cylinder

1. Calculate the hoop stress at the bottom of penstock, if a steel penstock of 1 m and 10 mm thick is subjected to 100m head of water. Take w = 9.81 kN/m^3.

a) 49 N/mm^2

b) 47 N/mm^2

c) 45 N/mm^2

d) 43 N/mm^2

View Answer

Answer: a
Explanation: We know that p = wh ; p = 9.81×100 = 981 kN/m^2= 0.981 N/mm^2.
Hoop stress = pd/2t = 0.981 ×1000/2×10 = 49 N/mm^2.

2. Maximum daily demand = _____ × Average daily demand.

a) 2.5

b) 3.5

c) 1.5

d) 4

View Answer

Answer: c
Explanation: Peak demand is a maximum consumption of water in an hour or in a day the effects of monthly variations of flow influences the design of pumps and services reservoirs.
Maximum daily demand = 1.5 × Average daily demand.

3. Which of the following is not a short term estimate in population forecast?

a) Graphical comparison

b) Geometrical increase method

c) Arithmetical increase method

d) Graphical extension method

View Answer

Answer: a
Explanation: Graphical comparison is a long term estimate. In this estimate, the population time curve of a given community can be extrapolated on the basis of trends experienced by similar and larger communities.

4. $Pn = P[1+r/100]^n$ is a formula used in ___________

a) Arithmetical increase method

b) Incremental increase method

c) Geometrical increase method

d) Graphical extension method

View Answer

Answer: c
Explanation: Geometrical increase method is used for young and rapidly growing cities
The formula used is $Pn = P[1+r/100]^n$; Where Pn = population of "n" decades
r = percentage rate of increase per year
n = number of years or decades.

5. According to Freeman, estimate of fire demand can be made from the formula?

a) Q = 3175 P

b) Q = 2125 P

c) Q = 1136.5 (P/5 +10)

d) Q = 2715 (P/5 + 10)

View Answer

Answer: c
Explanation: Fire fighting demand is provided acquisition draught on distribution system with normal supply to the consumers according to J R freeman's formulae :
Q = 1136.5 (P/5 + 10)
Q = quantity of water in litres per minute
P = population in thousands.

6. Fire hydrants are located in a main at a distance of _______________

a) 200 to 250 m

b) 150 to 200 m

c) 100 to 150 m

d) 50 to 100 m

View Answer

Answer: c
Explanation: A sufficient amount of water must therefore always be available to satisfy the peak demand and extinguish any possible fire. For effective fire protection, hydrants are located at about 150 m intervals.

7. In total consumption, losses account about ___________

a) 10

b) 15

c) 30

d) 25

View Answer

Answer: b
Explanation: In total consumption, losses account about 15 %.

Types of consumption	Percentage varies
Industrial and commercial demand	25 %

Public demand	15 %
Losses	15 %

8. _______ is integrated or summation hydrograph.

a) Mass curve

b) Mild curve

c) Ryve's curve

d) Dicken's curve

View Answer

Answer: a
Explanation: Mass curve diagram is the integrated or summation hydrograph. It shows the relation between time and cumulative discharges in a river.

9. ___________ is an example of a subsurface source.

a) Streams

b) Impounding reservoir

c) Rivers

d) Springs

View Answer

Answer: d
Explanation: When ground water appears at the surface for any reason springs are formed. The springs generally can supply small quantity of water.

10. Infiltration wells are ____________ wells constructed in series.

a) Vertical

b) Horizontal

c) Inclined

d) Radial

View Answer

Answer: a
Explanation: Infiltration wells are the vertical shallow wells constructed in series along the banks of rivers. The wells are connected by Porous pipes to a sump well called "jack well".

11. _______ are the horizontal tunnels laid along the banks of river.

a) Infiltration wells

b) infiltration reservoir

c) infiltration galleries

d) infiltration Springs

View Answer

Answer: c
Explanation: Infiltration galleries are used as source of water supply. These are the horizontal tunnels which are constructed through water bearing strata. They are usually laid along the banks of rivers, so that water can be drawn across the line of flow.

12. Carbonic acid is high in ______ springs.

a) Gravity

b) Surface

c) Artesian

d) Erotic

View Answer

Answer: b
Explanation: Surface springs are formed when subsoil water is exposed to the ground. The spring water which is not disturbed by the rainfall is usually attractive in appearance and of good palatability. However, the content of free carbonic acid is sometimes high and spring water may possess corrosive and plumb solvent properties.
advertisement

13. In _________ springs, that trench acts as a storage reservoir.

a) Surface

b) Erotic

c) Artesian

d) Gravity

View Answer

Answer: d
Explanation: Gravity springs are developed due to overflowing of water table. The flow from a gravity spring is variable with rise or fall of water table. In order to meet with such fluctuations, a trench may be constructed near such spring. That trench acts as a storage reservoir.

14. Which of the following wells are also known as water table well?

a) Deep wells

b) Open wells

c) Shallow wells

d) Sunk wells

View Answer

Answer: c
Explanation: Shallow well is a well which supply from the uppermost aquifer. The flow into the wells takes place only by gravity. Due to this depression, the well is also known as gravity well or water table well.

15. Calculate the strain energy of a member bearing stress of 0.0366 N/mm^2. If the length of the member is 1 m and a cross section area is 60000mm^2. Take $E = 2 \times 10^5$ N/mm^2.

a) 0.4 Nmm

b) 0.5 Nmm

c) 0.6 Nmm

d) 0.2 Nmm

View Answer

Answer: d
Explanation: Strain energy = f2/ 2E × Volume
$= (0.0366)^2 / 2 \times 2 \times 10^5 \times (60000) \times 1000$
= 0.2 Nmm.
[Thin Cylinder Under Strain]

1. Calculate the longitudinal strain, if internal pressure is 1.2 N/mm^2 and 1 m in diameter along with 10 mm thickness. Take $E = 2 \times 10^5 N/mm^2$ and Poisson's ratio as 0.3.

a) 0.00006

b) 0.0006

c) 0.006

d) 0.06

View Answer

Answer: a
Explanation: Longitudinal strain = pd/2tE ×(1/2 – 1/m)
$e = 1.2 \times 1000 / 2\times10\times2\times10^5\times(1/2 – 0.3)$
e = 0.00006.

2. The radial stress in cylinder walls is negligible.

a) True

b) False

View Answer

Answer: a
Explanation: The thickness of the plate is negligible compared to the diameter of shells in a shell is known as thin shell and in the thin shell, the radial stresses are negligible.

3. Distribution bars are also known as ___________

a) Transverse bars

b) Radial bars

c) Flexural bars

d) Regant bars

View Answer

Answer: a
Explanation: To resist the cracks due to variation of temperature and shrinkage stresses. The distribution bars are provided in addition to main bars along the shortest span. These bars are also known as transverse bars.

4. ________ is a saturated bed, which yields water.

a) Aquitard

b) Aquiclude

c) Aquifer

d) Aquifuge

View Answer

Answer: c
Explanation: An aquifer is a saturated bed or geologic formation which yields water in significant quantities. The example for the aquifer is a sand bed.

5. ________ possesses free surface open to the atmosphere.

a) Aquitard

b) Aquifuge

c) Unconfined aquifer

d) Aquiclude

View Answer

Answer: c
Explanation: An unconfined aquifer is one in which ground water process free open surface to the atmosphere. An aquifuge is an impervious formation that neither contains nor transmits water.

6. What is the porosity percentage in gravel?

a) 30 – 40 %

b) 50 – 60 %

c) 10 – 20 %

d) 1 – 10 %

View Answer

Answer: a
Explanation: The porosity percentage in gravel is 30 – 40 %.

Materials	Porosity
Clay	50 -60 %
Silt	40 – 50 %
Gravel	30 – 40 %

7. ___________ is a measure of its water yielding capacity.

a) Specific capacity

b) Specific weight

c) Specific yield

d) Yield capacity

View Answer

Answer: c
Explanation: The specific yield (Sy) of a material is a measure of its water yielding capacity and it is expressed quantitatively as a percentage of the total volume of material.

8. ________ is a measure of ease of flow of groundwater.

a) Permeability

b) Porosity

c) Voids ratio

d) Impermeability

View Answer

Answer: a
Explanation: The permeability is a measure of ease of flow of groundwater through aquifers and aquitards and coefficient of permeability is the numbers of litres of water per day that will flow through a medium.

9. Piezometric surface is a ____________ surface.

a) Real

b) Imaginary

c) Stationary

d) Motive

View Answer

Answer: b
Explanation: Piezometric surface is an imaginary surface to which water rises in wells tapping artesian aquifer.

10. _________ is a measure of the water retaining capacity of material (rock).

a) Specific capacity

b) Specific yield

c) Specific retention

d) Specific

View Answer

Answer: c
Explanation: Specific retention is denoted by Sr (S suffix r). It is a measure of water retaining capacity.
Sr = Vr/V [Vr = Volume of water retained].

11. Draw down is also known as __________

a) Frictional head

b) Depression head

c) Tensile head

d) Positive head

View Answer

Answer: b
Explanation: The difference in the level of the original water table and lowered water table due to pumping (or) drawing from a well is called draw down. It is also known as depression head.

12. The porosity range of sand stone be _________

a) 45 – 55 %

b) 20 – 25 %

c) 10 – 20 %

d) 1 – 10 %

View Answer

Answer: c
Explanation: The porosity range of sand stone be 10 – 20 %.

Materials	Porosity (%)
Gravel	30 – 40
Gravel and sand	20 – 25

Sand stone	10 – 20

advertisement

13. Recuperation test is carried out to determine yield of well.

a) True

b) False

View Answer

Answer: a
Explanation: Recuperation test K = 2.303 A/T log(H1/H2).
Q = KH
In this test, the water is first lower down to a safe level. The rise of water level and its corresponding time table is noted in a cross-sectional area of well different levels the yield of the well can be calculated.

14. Calculate thickness of metal, if the pressure inside the water main is 0.6 N/mm^2. The diameter of water main is 600 mm. Take hoop stress = 25 N/mm^2.

a) 7.20 mm

b) 9.45 mm

c) 10.58 mm

d) 12.24 mm

View Answer

Answer: a
Explanation: Thickness of metal fc = pd/2t
t = pd / 2 fc ;
= 0.6 ×600 / 2 ×25
= 7.2 mm.

15. Ratio of lateral strain to linear strain is __________

a) Poisson's ratio

b) Shear strength

c) Shear modulus

d) Bulk modulus

View Answer

Answer: a
Explanation: The ratio of lateral strain to the corresponding longitudinal strain is called poisons ratio and it is denoted by 1 / m.
The value of poisons ratio for elastic materials is in the range of 0.25 to 0.33.

[Thin Cylinder with Maximum Shear Stress]

1. Torsional modulus is ____________ to torsional strength.

a) Inversely proportional

b) Directly proportional

c) Equal

d) Unequal

View Answer

Answer: b
Explanation: As the value of torsional modulus increases, the torsional strength increases. For example, a hollow circular shaft compared to that of solid shaft of the same area will have more torsional strength.

2. _______ torque produces the maximum shear stress due to combined bending.

a) Seasonal

b) Equipment

c) Composite

d) Series

View Answer

Answer: b
Explanation: The equipment torque is the twisting moment which acts along to produce the maximum shear stress due to combined bending and torsion.

3. _______ is the structures installed for the purpose of drawing water.

a) Intakes

b) Conduits

c) Valves

d) Springs

View Answer

Answer: a
Explanation: The devices or structures installed for the purpose of drawing water from the sources are called intakes. Water is distributed from the source to the treatment through conduits.

4. _______ is an example of a gravity conduit.

a) C I pipes

b) Flumes

c) W I pipes

d) Steel pipes

View Answer

Answer: b
Explanation: Gravity conduits are those in which water flows under more action of gravity. Flumes are open channels supported on (over the ground surfaces).

5. ________ is the gravity conduits used while crossing a hill or lock.

a) Flumes

b) Aqueducts

c) Canals

d) Tunnels

View Answer

Answer: d
Explanation: Tunnels are portions of aqueduct used while crossing a hill or rock. They may be grade tunnels or pressure tunnels depending on whether the water flows with a free surface or under pressure.

6. In aqueduct, the nominal flow of velocity be ________

a) 0.5 m/s

b) 0.9 m/s

c) 0.6 m/s

d) 0.8 m/s

View Answer

Answer: b
Explanation: Aqueduct is covered waterways used to carry water from a remote source to origin of distribution. Water is not under pressure, so the aqueduct can even be built of brick with a velocity of 0.9 metre per second.

7. _____________ coincides with the water surface in a canal or open channel.

a) HGL

b) TEL

c) TWL

d) HTL

View Answer

Answer: a
Explanation: The hydraulic gradient line in channels coincides with the water surface in a canal or open channel. The generally canals are trapezoidal in shape but rectangular sections prove economical.

8. Pressure conduits are also known as _______

a) Pipe conduits

b) Gravity conduits

c) Artesian conduits

d) Surface conduits

View Answer

Answer: a
Explanation: Pressure conduits are also known as pipe conduits in which large amounts of water flow under pressure. The location is so chosen that it will be most favourable with regard to the construction cost and resulting pressures.

9. What is the flow of velocity in the pressure conduit?

a) 0.5 to 0.6 m/s

b) 0.6 to 0.7 m/s

c) 0.6 to 0.8 m/s

d) 0.8 to 1 m/s

View Answer

Answer: c
Explanation: Velocities should be high enough to prevent silt deposition in the pipe and should be about 0.6 to 0.8 m/s. At low points, in the pipes, blow off branches with valves are placed to drain the water.

10. Pressure conduits with steel pipes varies diameter _______

a) 2500 mm

b) 3000 mm

c) 3500 mm

d) 4000 mm

View Answer

Answer: b
Explanation: Steel pipes are manufactured for various purposes like rising mains, conveying mains distribution systems and inverted siphons. They are used in size ranging from 900 mm to 3000 mm in diameter.

11. Which of the following conduits possess low resistance to acid nature?

a) RCC pipes

b) PVC pipes

c) Steel pipes

d) PSC pipes

View Answer

Answer: c
Explanation: A partial vacuum is formed while emptying the steel pipeline, it is likely to collapse easily or get deform permanently. Steel pipes are more liable to resist acidic nature.

12. _______ pipes are not easily biodegradable.

a) RCC

b) PSC

c) PVC

d) G I

View Answer

Answer: a
Explanation: Reinforced concrete pipes maybe precast or cast in situ. The life of pipes is more than 65 years. They are not easily biodegradable. They can be manufactured with indigenous equipment.
advertisement

13. RCC pipes can be used up to a pressure of 3.0 kg/cm^2.

a) True

b) False

View Answer

Answer: a
Explanation: RCC pipes can be used up to a pressure of 3 kg/cm2. Cast Iron pipes and steel pipes up to 24 kg/cm^2.

14. Expand HDPE?

a) High Density Polyvinyl Pipe

b) High Density Polyethylene Pipe

c) High Deformed Polyvinyl Pipe

d) High Deformed Polyethene Pipe

View Answer

Answer: b
Explanation: HDPE stands for High Density Polyethylene Pipe. HDPE pipes of sizes ranging from 300 to 3000 mm internal diameter are manufactured by a helical winding process.

15. _______ conduits are 1/10 weight of concrete.

a) PVC

b) GRP

c) RCC

d) CI

View Answer

Answer: b
Explanation: Fibre glass reinforced plastic pipes are manufactured using glass fibre, polyester resin and fillers to form a homogeneous structure. They are light in weight (1/5 of the steel and 1/10 of concrete).
Thin Spherical Shells Under Stress

1. ___________ stress does not exceed the permissible tensile stress for the shell material.

a) Axial

b) Longitudinal

c) Hoop

d) Lateral

View Answer

Answer: c
Explanation: Circumferential (hoop) stress does not exceed the permissible tensile stress (Pt) for the shell material
fh<Pt
t = pd/2fh.

2. To determine hoop stress, efficiency of __________ is to be considered.

a) Construction joint

b) Transverse joint

c) Longitudinal joint

d) Rivet joint

View Answer

Answer: c
Explanation: To find hoop stress, the efficiency of longitudinal joints to be considered.
fh=pd/2t nl; Where
fh = hoop stress
p = internal pressure
t = thickness of metal
d = diameter
nl = efficiency of longitudinal joint.

3. Cast Iron pipes are being joined a __________

a) Flange joint

b) Expansion joint

c) Socket and spigot joint

d) Simplex joint

View Answer

Answer: c
Explanation: Cast iron pipes are being joined socket and spigot joint. The enlarged end is called socket while the normal end is called spigot. The spigot is fitted into the socket.

4. Bell joint is also known as ____________

a) Spigot joint

b) Expansion joint

c) Socket joint

d) Simplex joint

View Answer

Answer: c
Explanation: Socket and spigot joint sometimes called bell and spigot joint. It is flexible and allows the pipes to be laid on flat curves without use of specials.

5. Which of the following joint is a simplex joint?

a) Flanged joint

b) Socket and spigot joint

c) AC pipe joint

d) Expansion joint

View Answer

Answer: c
Explanation: AC pipes are joined by means of a special type of coupling called simplex joint which consists of a pipe and two rubber rings.

6. The mortise and tenon are provided in ___________ joint.

a) Concrete

b) Spigot

c) A C pipe

d) Flanged

View Answer

Answer: a
Explanation: The concrete pipes are provided with mortise at one end and a suitable tenon each other and the mortise and tenon are tightly set by placing concrete mortar.

7. _________ head should be higher than working head in a hydraulic test.

a) Pressure

b) Water

c) Working

d) Gauge

View Answer

Answer: c
Explanation: In a hydraulic test, to detect leakage the lower end of pipe is plugged and filled with water. The hydrostatic head should be higher then working head for 2 hours for ensuring leakage.

8. Leakage should be nil or minimum by following equation Q = ____________ × ND $(P)^{1/2}$.

a) 3/3300

b) 2/3300

c) 4/3300

d) 3/2200

View Answer

Answer: b
Explanation: To ensure nil leakage, the equation to be followed is Q = 2/3300 ND × $(P)^{1/2}$.
Q = allowable leakage (l/h)

N = number of joints
D = pipe diameter
P = total pressure applied.

9. _______ is used to magnify the sound for detecting leakage.

a) Aquagaurd

b) Otoscope

c) Sonoscope

d) Horoscope

View Answer

Answer: c
Explanation: Leakages can be detected by the sounding rod method. In this method, sound can be magnified by Sonoscope. The rod is pulled up and observed whether the point is dry or most as it indicates leakage.

10. Which of the following is not a leakage detection method?

a) Direct observation

b) By plotting HGL

c) Pipe corrosion

d) Sounding rod

View Answer

Answer: c
Explanation: The term pipe corrosion is used to indicate the loss of pipe material due to the action of water. The metal chiefly concerned with corrosion of iron and steel, of which mains and distribution pipes are usually composed.

11. Which of the following is not a cause of corrosion?

a) The cathodic reaction

b) Depolarization

c) Reaction of metal ions

d) Proper pipe material

View Answer

Answer: d
Explanation: It is one of the steps in the prevention of corrosion, the pipe material if metallic should be able to resist that dissolve effect of water.

12. A pipe sunk into the ground to draw the underground water is known as ___________

a) An open well

b) A tube well

c) An artesian well

d) An infiltration well

View Answer

Answer: b
Explanation: Tube wells are the wells made by drilling holes in to the ground encased with pipes and strainers. The diameter varies between 0.15 to 0.6 m.
advertisement

13. Which of the following well is also known as flowing well?

a) Gravity well

b) Artesian well

c) Drilled wells

d) Driven wells

View Answer

Answer: b
Explanation: Artesian Wells derives water from confined aquifers under pressure. As a result, ground water flows from the well such a well is known as flowing well.

14. The water bearing strata is known as __________

a) An aquifer

b) An aquiclude

c) An aquifuge

d) An aquitard

View Answer

Answer: a
Explanation: An aquifer is defined as a saturated bed or geologic formation which yields water in significant quantities Eg. Sand bed.

15. The difference in levels of water in a well before and after pumping is called ________

a) Cone of depression

b) Yield

c) Draw down

d) Water table

View Answer

Answer: c
Explanation: When water is pumped from a well, the water around the well under the action of head caused due to difference in level of the original water table and lowered water table. This head is known as draw down or depression head.
Thin Spherical Shells Under Strain

1. A cylindrical section having no joint is known as _____________

a) Seamless section

b) Efficient section

c) Rivet less section

d) Anchorage section

View Answer

Answer: a
Explanation: A cylindrical section having no joint is known as a seamless section. Built up section is not that strong as a seamless section of the same thickness.

2. Strength of joint = efficiency × __________

a) Strength of section

b) Depth of plate

c) Length of plate

d) Strength of plate

View Answer

Answer: d
Explanation: The ratio of strength of joint to the strength of our plate is called the efficiency.
Strength of joint = efficiency × strength of plate.

3. The presence of calcium and magnesium chloride in water causes ___________

a) Hardness

b) Bad taste

c) Turbidity

d) Softening

View Answer

Answer: d
Explanation: The characteristic of water that does not give lather easily with soap is called hardness of water. It is of two types of temporary hardness and permanent hardness.

4. The calcium carbonate in water is _____________

a) Causes bad taste

b) Increases hardness of water

c) Causes turbidity

d) Softens water

View Answer

Answer: d
Explanation: Calcium carbonate in the water indicates temporary hardness, it can be removed either by boiling or by adding lime to the water.

5. Red colour in water denotes?

a) Mn

b) Fe

c) Nacl

d) Ca

View Answer

Answer: b
Explanation: The presence of iron in the water gives red colour and the brown colour in water denotes the presence of manganese. According to the standards of water, manganese and iron should not be more than 0.3 ppm.

6. The water of the river has an important property known as __________

a) Turbidity

b) Permeability

c) Infiltration capacity

d) Self purification

View Answer

Answer: d
Explanation: The flow of water in a river has an important aspect of cleaning. In the river, there is the number of

layers of fine and coarse aggregates that periodically filter the water and hence the water of a river has an important property of self purification.

7. The type of joint provided to release thermal stresses is called ________

a) Socket and spigot joint

b) Expansion joint

c) Flash joint

d) Simplex joint

View Answer

Answer: b
Explanation: Expansion joints are provided at suitable intervals in the pipelines, so as to resist the thermal stresses produced due to temperature variations.

8. In ___________ pipes, the discharging capacity reduces as the life period increases.

a) Galvanised Iron

b) Cast Iron

c) PVC

d) Steel

View Answer

Answer: a
Explanation: Galvanised Iron pipes are heavy and uneconomical. The discharging capacity reduces as life period increases. They are likely to break during transportation and placing.

9. Isolated ___________ decrease stability in the ecosystem.

a) Food web

b) Food chain

c) Food pyramid

d) Food numbers

View Answer

Answer: b
Explanation: Food chain is a sequence of eating and being eaten in an ecosystem. It involves a single linear pathway. The isolated food chains decrease the stability of an ecosystem.

10. The presence of hydrogen sulphide in water causes _________

a) Bad taste

b) Acidity

c) Basicity

d) Softening

View Answer

Answer: b
Explanation: The acidity of water is a measure of its capacity to neutralize bases. Acidity is nothing but a representation of carbon dioxide or carbonic acid. The presence of hydrogen sulphide indicates acidic nature in the water, it should be in a nominal amount.

11. The turbidity in water is expressed in terms of _________

a) pH value

b) Silica scale

c) Ppm

d) Platinum cobalt scale

View Answer

Answer: b
Explanation: Turbidity is an indication of the apparent colour of Water on account of suspended inorganic matter such as silt, clay and mud particles. The turbidity is expressed in silica scale.

12. NTU is measurement unit of ________

a) Turbidity

b) Chlorines

c) Hardness

d) Colour

View Answer

Answer: a
Explanation: Water is turbid when it contains visible material in suspension such as clay, silt, finely divided organic matter and other microscopic matter. NTU stands for nephelometric turbidity unit.
advertisement

13. Taste and odour are expressed in terms of _______

a) GTU

b) Threshold numbers

c) Silica scale

d) Ppm

View Answer

Answer: b
Explanation: Threshold odour number is the dilution ratio at which the odour is just detectable. The odour can be estimated by osmoscope whereas colour can be estimated by calibration method.

14. The water is considered soft when the ppm is between ________

a) 0 – 50

b) 50 – 100

c) 100 – 150

d) Over 250

View Answer

Answer: a
Explanation: The water is considered soft when the ppm is between 0 – 50.

Hardness Scale(ppm)	Nature of water
0-50	Soft
50-100	Moderately soft

100-150	Slightly hard
150-200	Moderately hard

15. Expand MPN?

a) Maximum proximity number

b) Most probable number

c) Membrane plate notation

d) Maximum probable notation

View Answer

Answer: b
Explanation: Most probable number is a number which represents the bacterial density which is most likely to be present. It is one of the methods to estimate the bacterial quantity of water.
Thick Cylinder Shell

1. _______ is as the maximum energy that can be absorbed within the proportionality limit.

a) Proof resilience

b) Modulus of resilience

c) Impact resilience

d) Resilience

View Answer

Answer: a
Explanation: Proof resilience is defined as the maximum that can be absorbed with in the proportionality limit without creating a permanent distortion.

2. The compressive strength of brittle materials is _________ its tensile strength.

a) Equal to

b) Less than

c) Greater than

d) As same as

View Answer

Answer: c
Explanation: The compressive strength of brittle materials is greater than its tensile strength. The tensile strength of ductile material is greater than its compressive strength.

3. The tensile test is carried on ________ material.

a) Ductile

b) Brittle

c) Malleable

d) Plastic

View Answer

Answer: a
Explanation: The tensile stress is carried on the tensile materials. In the same way, the compression test is carried on brittle materials.

4. The breaking stress is _____________ the ultimate stress.

a) Equal to

b) Less than

c) Greater than

d) As same as

View Answer

Answer: b
Explanation: The stress developed in a material without any permanent stress is called elastic limit and the breaking stress is always less than the ultimate stress.

5. The ductility of a material is ___________ to the increase in percentage reduction in an area.

a) inversely proportional

b) directly proportional

c) equal

d) uniform

View Answer

Answer: a
Explanation: The ductility of material increases with the increase in percentage reduction in area of a specimen under tensile stress.

6. The odour of water can be determined by __________

a) Jackson turbidometer

b) Osmoscope

c) Thermometer

d) Sonoscope

View Answer

Answer: b
Explanation: The main causes of odour in water are algae, sewage and dissolved gases. Taste and odour can also be expressed in terms of odour density. Odour can be estimated by osmoscope.

7. The colour of water is expressed in terms of _________

a) pH value

b) Silica scale

c) Platinum cobalt scale

d) Ppm

View Answer

Answer: c
Explanation: Colour is caused by the presence of colloidal substance is aquatic growth etc. in water should be distinguished from turbidity which is termed as apparent colour. The colour is expressed in Platinum Cobalt scale. Colour may be removed by coagulation and adsorption method.

8. High turbidity of water can be determined by ___________

a) Hellipe turbidometer

b) Baylis turbidometer

c) Jackson's turbidometer

d) Turbidity rod

View Answer

Answer: b
Explanation: The turbidity of potable water should be within 10 PPM or with in 10 units on the silica scale. High turbidity of water can be determined by Jackson turbidity metre and low turbidity of water can be determined by baylis turbidity metre.

9. The maximum permissible total solid content in water for domestic purposes should not exceed.

a) 350 ppm

b) 600 ppm

c) 500 ppm

d) 1000 ppm

View Answer

Answer: c
Explanation: Analytically, the total solids content of water is defined as all the matter that remains as residue upon evaporation. The standards for drinking water is acceptable limit is 500 ppm.

10. Membrane filter technique is used for testing?

a) Copper

b) E -coli

c) Bacteria

d) Boron

View Answer

Answer: b
Explanation: Membrane filter technique is considered as superior method. In this procedure, unknown volume of water sample is filtered through a membrane with opening less than 0.5 microns.

11. E – coli was formerly known as __________

a) F. Coli

b) B. Coli

c) G. Coli

d) R. Coli

View Answer

Answer: b
Explanation: The pathogenic bacteria are generally inherent in the qualifying group of Bacteria of which the bacillus coli (B. Coli) now called as Escherichia coli (E.Coli) is prominent.

12. _______ sample collected at an instant particularly.

a) Composite

b) Grab

c) Integrated

d) Differential

View Answer

Answer: b
Explanation: To determine the character of the sample, at that particular instant is known as grab sample. The frequency of grab sampling depends upon the magnitude of fluctuation in the quality of source.
advertisement

13. Which of the following samples is also known as catch sample?

a) Integrated

b) Composite

c) Grab

d) Scratch

View Answer

Answer: c
Explanation: In sampling, catch sample collected from the sampling spot at any instant. It is also known as grabbing sample. It is influenced by the nature of tests are to be conducted.

14. If fluoride concentration in drinking water increases to more than _______ ppm, it causes fluorosis.

a) 2.5

b) 2

c) 1.5

d) 3

View Answer

Answer: c
Explanation: When the concentration of fluoride increases to more than 1.5 ppm, a disfigurement involving staining of teeth known as mottled tooth enamel is caused. This disease is also termed as fluorosis.

15. What is the desirable limit for sulphates in drinking water?

a) 180 ng/L

b) 230 mg/L

c) 150 mg/L

d) 340 mg/L

View Answer

Answer: c
Explanation: Sulphates ion is one of the major ions occurring in natural waters. In drinking water, sulphate causes a laxative effect and leads to scale formation in boilers. The desirable limit in drinking water is 150 mg /L.

Trusses – 1

1. ___________ is a framed structure composed of members.

a) Purlin

b) Gussets

c) Ridge tops

d) Truss

View Answer

Answer: d
Explanation: A truss is defined as a framed structure composed of members connected to each other at their ends and forming triangles which lie in the same plane.

2. Trusses are subjected to ____________ stress.

a) Compressive

b) Tensile

c) Direct

d) Lateral

View Answer

Answer: c
Explanation: Trusses are the members which are subjected to direct stress, as the truss is usually loaded at the point of intersection of its member only.

3. Trusses are adopted for ____________ span.

a) Medium

b) Short

c) Very large

d) Large

View Answer

Answer: c
Explanation: Trusses are useful at the places of high rainfall to avoid roof drainage problems. For very large span the use of beams will make the construction most uneconomical.

4. The top line of roof truss is called as ____________

a) Eves

b) Main tie

c) Pitch

d) Ridge line

View Answer

Answer: d
Explanation: The top line of the roof truss is called "ridge line". The bottom edge of roof surface is called a ridge line. Corrugated galvanised iron (GI) or asbestos cement (AC) sheets are commonly used for roof covering.

5. If the members connected don't lie in the same plane, then structures are called ___________

a) Space truss

b) Plane truss

c) Main truss

d) Foot truss

View Answer

Answer: a
Explanation: If all the members connected at the ends do not lie in the same plane then the structure (truss) is called as space truss. If the members lie in the same plane, then the structure is called plane truss.

6. King post trusses are used for spans ______

a) 5 to 8 m

b) 6 to 9 m

c) 4 to 6 m

d) 6 to 8 m

View Answer

Answer: b
Explanation: Generally trusses are used when the span is large and intermediate supports for purlins and ties are unavailable. A king post truss is used for spans of 6 to 9 m.

7. ________ shape of the frame offers great rigidity.

a) Trapezoidal

b) Triangular

c) Rectangular

d) Square

View Answer

Answer: b
Explanation: The framework of the truss should be built in a way that, it does not change its shape when loaded. The triangular shape of frame offers great rigidity and hence it is generally adopted.

8. Which of the following roof are used on small sheds and veranda opening?

a) Couple roof

b) Collar roof

c) Pent roof

d) Purlin roof

View Answer

Answer: c
Explanation: Pent roof is one of the simplest forms of pitched roofs. The sort of sloping roof consists of common rafters which are generally inclined at 30°. It is suitable for span up to 2.5 m. It is widely used on small sheds and veranda openings.

9. The joints in king post are of ________

a) Butt

b) Welded

c) Mortice and tenon

d) Lap

View Answer

Answer: c
Explanation: The joint between the principal rafter and the king post is made by making tenon in the principal rafter and a corresponding mortice into the head of the king post. The joint is further strengthened by an iron stirrup.

10. About ____________ % volume of concrete is occupied by aggregates.

a) 60%

b) 50%

c) 75%

d) 30%

View Answer

Answer: c
Explanation: Around 75% volume of concrete is occupied by aggregates. Hence the structural behaviour of

concrete is significantly influenced by the type of aggregates used. The aggregate used for the concrete should be durable, strong, hard and well graded.

11. Which of the following cement is used for marine structures?

a) Rapid hardening cement

b) Hydrophobic cement

c) High Alumina cement

d) Super sulphated cement

View Answer

Answer: c
Explanation: High Alumina cement is used for marine structures.

Type of cement	Usage
Rapid hardening cement	Road works and repairs
Hydrophobic cement	Swimming pools and food processing plants
High Alumina cement	Marine structures

12. IS: 455 is associated with _____________

a) Portland slag cement

b) Ordinary Portland cement

c) High alumina cement

d) Super sulphated cement

View Answer

Answer: a
Explanation: IS: 455 is associated with Portland slag cement.

Type of cement	IS Code
Portland slag cement	IS 455
Ordinary Portland cement	IS 269
High alumina cement	IS 6452

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13. Which of the following is used as retarding admixture?

a) Calcium chloride

b) Fluosilicates

c) Treitanlamine

d) Starch

View Answer

Answer: d
Explanation: Retarding admixtures are added to slow down the rate of setting of cement. They are useful in hot weather concreting. The common types of retarders are cellulose products, sugar starch etc.

14. Polyhydroxy compounds are ________

a) Accelerating admixtures

b) Retarding admixtures

c) Water reducing admixtures

d) Air entraining admixtures

View Answer

Answer: c
Explanation: Polyhydroxy compounds are Water reducing admixtures.

Type of admixture	Materials
Accelerating	Calcium chloride, fluosilicates
Water reducing	Lignosulphonate,polyhydroxyl
Retarding	Sugar, hydroxyl-carboxylic acid

15. Plasticizing admixture means __________

a) Accelerating admixtures

b) Water reducing admixtures

c) Air in training admixtures

d) Superplasticizers

View Answer

Answer: b
Explanation: In water reducing admixtures, the addition of plasticizer allows greater workability for given water cement ratio or alternatively retains workability while reducing the water content. They are also called as plasticizing admixtures.
Trusses – 2

1. The economical spacing of roof trusses works out to be _________ span.

a) 1/2 to 1/5 span

b) 1/3 to 1/5 span

c) 1/2 to 1/3 span

d) 1/4 to 1/6 span

View Answer

Answer: b
Explanation: The economical spacing of roof trusses works out to be 1/3 to 1/5 of the span. A structure that is composed of a number of line numbers connected at the ends to form a triangulated framework is called a truss.

2. The top chord members of roof truss is called ___________

a) Common rafters

b) Principal rafters

c) Main tie

d) Pitch

View Answer

Answer: b
Explanation: The top chord members of roof truss are called principal rafters. They support the roof covering through purlins. They are mainly compression members.

3. The bottom chord member of truss is known as ___________

a) Main tie

b) Principal rafters

c) Common rafters

d) Purlins

View Answer

Answer: a
Explanation: The bottom chord member of the truss is known as the main tie. It is usually in tension and takes compression if reversal of loads occurs due to wind load intensity.

4. _______ is a roof beam supported by roof truss.

a) Ridge line

b) Eve

c) Principal rafter

d) Purlins

View Answer

Answer: d
Explanation: Purlin is a roof beam supported by roof truss. The purlin is designed as a beam subjected to bending moment about to axes. The various loads used in design of purlins are:
i. Dead load
ii. Imposed load
iii. Wind load.

5. The ratio of rise to span of truss is called a ___________

a) Slope

b) Splay

c) Pitch

d) Tie

View Answer

Answer: c
Explanation: Pitch of roof truss is defined as the ratio of rise to the span of a truss. It should be 1/6 for G I sheets, 1/12 for AC sheets and ¼ when snow load occurs besides wind load.

6. The angle of repose is zero for _______________

a) Water

b) Masonry

c) Soil

d) Cement

View Answer

Answer: a
Explanation: Angle of repose is defined as the maximum natural slope at which the soil particles will rest due to internal friction if left unsupported for long time. Angle of repose of soil depends on its nature and moisture content. For water, the angle of repose is zero.

7. Biological Oxygen Demand (BOD) of safe drinking water must be _________

a) 10

b) 15

c) 5

d) 0

View Answer

Answer: d
Explanation: The water should be free from BOD to ensure it as fit for drinking. According to standards of potable water, free ammonia should not be more than 0.15 ppm and nitrites should not be more than 20 ppm.

8. The most common coagulant is ______________

a) Magnesium sulphate

b) Alum

c) Chlorine

d) Salt

View Answer

Answer: b
Explanation: The substance which is used for coagulation is known as a coagulant. Alum has proved to be an effective covalent and it is widely used the coagulant is effective between pH range of 6.5 to 8.5.

9. The process of forming thick gelatinous precipitates is known as ____________

a) Sedimentation

b) Flocculation

c) Coagulation

d) Filtration

View Answer

Answer: b
Explanation: When coagulants are dissolved in water, they produce thick gelatinous precipitates. This precipitate is known as floc and the process is known as flocculation. The floc is heavy and hence it starts to settle down at the bottom of the tank.

10. What is the desirable limit of calcium in drinking water?

a) 45 mg/l

b) 60 mg/l

c) 75 mg/l

d) 90 mg/l

View Answer

Answer: c
Explanation: According to Indian standards

Parameter	Desirable limit (ppm)
Nitrates	45
Calcium	75
Magnesium	< 30

11. Oxidation is done in __________ method.

a) Sedimentation

b) Filtration

c) Coagulation

d) Aeration

View Answer

Answer: d
Explanation: Aeration is a method by which water is brought in close contact air so as to absorb oxygen for the reduction of taste, odour etc. by virtue of oxidation.

12. Which of the following is a method of aeration?

a) Mechanical straining

b) Cascades

c) Biological metabolism

d) Electrolytic changes

View Answer

Answer: b
Explanation: Usage of the cascade is a method of aeration, in which the water is allowed to fall over a series of concrete steps. During the fall, the water gets thoroughly mixed with the atmospheric air and gets aerated.
advertisement

13. Which of the following is not a method of chlorination?

a) As bleaching powder

b) As free chlorine gas

c) As chloramines

d) Use of chloramines

View Answer

Answer: d
Explanation: Use of chloramine is a method of disinfection. It is found that chlorine alone is not stable in water

but when it is mixed in water with ammonia, it forms compounds known as chloramines. These are very effective in killing bacteria.

14. Bulk modulus is denoted by __________

a) A

b) E

c) K

d) V

View Answer

Answer: c
Explanation: The ratio of direct stress to corresponding volumetric strain is found to be constant which is called as bulk modulus
Bulk modulus = Direct stress/Volumetric strain.
• It is denoted by "k".

15. The stress corresponding to 0.2% of strain in the stress-strain curve is _________

a) Proof stress

b) Working stress

c) Direct stress

d) Tenacity

View Answer

Answer: a
Explanation: The stress corresponding to 0.2% of strain in the stress-strain curve of mild steel is known as proof stress and this also taken as yield stress. The maximum stress is generally taken as yield stress.
Definition of Column

1. Column is a tension member.

a) True

b) False

View Answer

Answer: b
Explanation: Compression members are the structural elements that are pushed together or carrying a load; more technically they are subjected to axial compressive forces. Example: Column, strut etc.

2. __________ is a vertical member subjected to direct compressive force.

a) Strut

b) Beam

c) Column

d) Post

View Answer

Answer: c
Explanation: A vertical member subjected to direct compressive forces is called a column or pillar. The column transfers the load from the beams or slab to the footings and foundations.

3. The inclined member carrying compressive loads is __________

a) Post

b) Stanchion

c) Strut

d) Column

View Answer

Answer: c
Explanation: The inclined member carrying compressive load in case of frames and trusses is called as a strut. A strut is a member of a structure in any position carrying an axial load. Strut may be horizontal, inclined or even vertical.

4. A built up rolled steel section carrying compressive force is called ___________

a) Post

b) Pillar

c) Strut

d) Stanchion

View Answer

Answer: d
Explanation: A built up rolled Steel section carrying compressive force is known as "stanchion". A wood member carrying compressive force is called a "post".

5. The process of removing chlorine from water is known as ____________

a) De chlorination

b) Re chlorination

c) Post chlorination

d) Pre chlorination

View Answer

Answer: a
Explanation: De chlorination means removing the chlorine from the water this is generally required when super chlorination has been practiced.

6. The organic impurities in the water from a layer on the top of a filtering media are called _______

a) Filter layer

b) Permeable layer

c) Impermeable layer

d) Dirty skin

View Answer

Answer: d
Explanation: The water from the sedimentation tank is allowed to enter over a bed of sand through the inlet chamber. The water percolates through sand bed during the dry skin is formed. The organic and bacterial impurities are removed by this layer.

7. The rate of filtration in slow sand filter is ___________

a) 100 to 150 lit/hr/m^2

b) 150 to 200 lit/hr/m^2

c) 250 to 350 lit/hr/m^2

d) 100 to 200 lit/hr/m^2

View Answer

Answer: d
Explanation: The slow sand filter is effective in bacterial removal and it is preferable for uniform quality of treated water. It is simple to construct and supervise. The rate of filtration is small and ranges from 100 to 200 lit/hr/m^2.

8. The sand used for filtration should not lose weight more than ________ when placed in Hcl for 24 hours.

a) 5 %

b) 10 %

c) 15 %

d) 20 %

View Answer

Answer: a
Explanation: According to the board of Indian Standards [BIS], the sand which is used for filtration process should not lose weight more than 5% when placed in hydrochloric acid for one day (24 hours).

9. Cleaning period of slow sand filter is taken as __________

a) 1 to 3 weeks

b) 1 to 3 days

c) 1 to 3 months

d) 1 to 2 hours

View Answer

Answer: c
Explanation: For the purpose of cleaning the top layer of sand is removed to a depth of 15 mm to 25 mm. The water is admitted to the filter the cleaning interval varies from 1 to 3 months.

10. The efficiency of slow sand filter is about ___________

a) 99 %

b) 95 %

c) 85 %

d) 90 %

View Answer

Answer: a
Explanation: The slow sand filters remove suspended and bacterial impurities to an extent of 98 to 99%. It requires a large area and unsuitable for treating high turbid water.

11. What is the uniformity coefficient of sand used in the rapid sand filter?

a) 1.5

b) 1.35

c) 1.75

d) 1.6

View Answer

Answer: c
Explanation: The effective size of sand used in rapid sand filter is 1.5 mm and the uniformity Coefficient varies from 1.25 to 1.35.

12. The dosage of ozone is about ________ ppm residual ozone.

a) 2 to 3 ppm

b) 2 to 4 ppm

c) 1 to 5 ppm

d) Zero

View Answer

Answer: a
Explanation: Ozone easily breaks down with oxygen and releases nascent oxygen which is powerful in killing bacteria. It also reduces organic matter present in the water the dosage of ozone is about 2 to 3 ppm.
advertisement

13. Which of the following process is also known as Ion exchange process?

a) Lime soda process

b) Base exchange process

c) Demineralization process

d) Cation exchange process

View Answer

Answer: a
Explanation: Softening of water can be done by the demineralization process which is also known as deionized water. In, each method minerals are removed my pass in the water through a bed of cation exchange resin.

14. Aeration is effective in removing of _________ odours.

a) 60 %

b) 75 %

c) 30 %

d) 40

View Answer

Answer: b
Explanation: Aeration is effective in removing 75% of odours. This process also removes carbon dioxide to a great extent. Aeration is affected by filtering it through perforated trays through different methods.

15. Which of the following is a control measure of removal of colour, taste and order?

a) Ozone treatment

b) Silver treatment

c) Copper sulphate treatment

d) Use of chloramines

View Answer

Answer: c
Explanation: Copper sulphate also helps in the removal of colour taste and odour it prevents the growth of algae and also acts as disinfectant. It is used for swimming pool water to give play then colour.
Euler's Theory at Critical Load with Effective Length

1. _____________ of column mainly depends upon end conditions.

a) Radius of gyration

b) Slenderness ratio

c) Factored load

d) Effective length

View Answer

Answer: d
Explanation: The effective length of a column with given end conditions is a length of an equivalent column of the same material and cross section with hinged ends. The effective length of the column mainly depends upon end conditions.

2. The hinged end is also known as ____________

a) Fixed end

b) Pinned end

c) Rigid end

d) Free end

View Answer

Answer: b
Explanation: In hinged end case, the end is fixed in position only (but the direction is free). The deflection in the case of this end is zero. (y = 0). It is also known as "Pinned end".

3. Long columns fail due to _____________

a) Direct stress

b) Buckling stress

c) Lateral stress

d) Tensile stress

View Answer

Answer: b
Explanation: In long columns, direct stress is very small compared to the bending stresses. The long column commonly fails because of bending stress.

4. In short columns, the slenderness ratio is less than ___________

a) 32

b) 64

c) 56

d) 28

View Answer

Answer: a
Explanation: The short column fails primarily due to direct stress. In short columns, the buckling stresses are very small compared to direct stresses. The short column is a column whose slenderness ratio is less than 32.

5. For ____________ columns, the slenderness ratio is more than 32 and less than 120.

a) Long

b) Short

c) Average

d) Medium

View Answer

Answer: d
Explanation: Medium column is a column which fails either due to direct stress or buckling stress. For medium

columns, the slenderness ratio is more than 32 and less than 120. For medium columns, the length is more than 8 times but less than 30 times their least lateral dimension.

6. Radius of gyration is denoted by ___________

a) k

b) g

c) y

d) s

View Answer

Answer: a
Explanation: The ratio of square root of the moment of inertia (I) to the cross sectional area(A) is called "radius of gyration". It is denoted by "k" or "r".
$K = (I/A)^{1/2}$.

7. The ___________ is the distance between Centres to centre of effective lateral ends.

a) Mean length

b) Stripped length

c) True length

d) Actual length

View Answer

Answer: d
Explanation: The actual length of a column is defined as the distance between the centre to centre of effective lateral restraints (L).

8. The slenderness ratio is the ratio of effective length to least _______________

a) Ultimate load

b) Actual length

c) Radius of gyration

d) Factor of safety

View Answer

Answer: c
Explanation: The ratio of effective length to the least radius of gyration (k) is called the slenderness ratio. For good design purpose, the slenderness ratio should be as small as possible to an extent.

9. Which of the following is also known as the working load?

a) Safe load

b) Crippling load

c) Ultimate load

d) Buckling load

View Answer

Answer: a
Explanation: A column and Strut can never be subjected to critical load and the column is subjected to less than a critical load. This load is phenomenally known as safe load or working load.

10. Factor of safety is a ratio of crippling load to ___________ load.

a) Critical load

b) Buckling load

c) Safe load

d) Ultimate load

View Answer

Answer: c
Explanation: The ratio of crippling load to the safe load of a column is called a factor of safety.
Factor of safety = Crippling load/Safe load
• The safe load is obtained by dividing the critical load by a number (called factor of safety).

11. At ____________ load, the column is said to have developed an elastic instability.

a) Safe

b) Working

c) Factored

d) Crippling

View Answer

Answer: d
Explanation: The load at which the column just buckles is called crippling load. The column is said to have developed an elastic instability, at this load. The buckling of a column takes place along least radius of gyration or least moment of inertia.

12. The value of __________ is relatively high for short columns.

a) Safe load

b) Factored load

c) Working load

d) Buckling load

View Answer

Answer: d
Explanation: The load at which the column just bents or buckles is called buckling load or critical load or crippling load. The value of buckling load is low for long columns and relatively high for short columns.
advertisement

13. The slenderness ratio is _________ to critical stress.

a) Directly proportional

b) Inversely proportional

c) Equal

d) Transverse

View Answer

Answer: b
Explanation: As the slenderness ratio increases, the permissible stress or critical stress reduces. Consequently, the load carrying capacity also reduces. In this way, the slenderness ratio behaves inversely proportional to the critical stress induced.

14. For a given material length, end conditions and equal area the shape of the column which is most efficient as per Euler's is __________

a) Square

b) Circular

c) I section

d) Tubular

View Answer

Answer: d
Explanation: As the radius of gyration will be least along the major axis of cross section. For example rectangular column along y-axis; for a given area, the tubular section will have a maximum radius of gyration. It is more efficient than any other section.

15. What is the rankines constant for cast iron?

a) 1/2000

b) 1/2400

c) 1/ 1600

d) 1/ 1800

View Answer

Answer: c
Explanation: Rankines constant for cast iron is 1/ 1600.

Material	Rankine's constant
Wrought Iron	1/9000
Cast Iron	1/1600
Timber	1/750

Euler's Theory at Eccentrically Loaded

1. Long axially loaded columns tends to deflect about ___________

a) Moment of inertia

b) Effective length

c) Core

d) Safe loading

View Answer

Answer: a
Explanation: A long axially loaded column tends to deflect about the axis of least moment of inertia the least radius of gyration and it should be used for determining the slenderness ratio.

2. What is the effective length of a column at both ends fixed?

a) l/3

b) l

c) l/2

d) 2×l

View Answer

Answer: c
Explanation: The effective length of a column at both ends fixed is L =l/2.

End condition	Effective length
Both ends hinged	L = l
Both ends fixed	L =l/2

3. Which of the following is the method of removing the temporary hardness of water?

a) Lime soda method

b) Base exchange process

c) Boiling

d) Chlorination

View Answer

Answer: c
Explanation: When the water is boiled up to a temperature of 80 degree, most of the bacteria will be killed and bicarbonates of calcium and magnesium are also eliminated.

4. The application of chlorine beyond the stage of break point is __________

a) Double chlorination

b) Post pollination

c) Super chlorination

d) Breakpoint chlorination

View Answer

Answer: c
Explanation: Super chlorination is a term which indicates the addition of an excessive amount of chlorine that is 5 to 15 mg / l to the water that is the application of chlorine beyond the stage of break point.

5. Which of the following methods of disinfection is usually adopted in swimming pools?

a) Excess lime treatment

b) Iodine – Bromine method

c) Pottasium permanganate method

d) Ultraviolet rays method

View Answer

Answer: d
Explanation: Ultraviolet rays are highly disinfectants and kill the bacteria. The rays penetrate in water and kill the bacteria. This process is very costly and requires technical skill and costly equipment. This method is adapted generally in swimming pools.

6. Hardness due to calcium bi carbonate can be removed by ____________

a) Boiling

b) Excessive lime

c) Zeolite

d) Soda treatment

View Answer

Answer: b
Explanation: Lime is generally used as a water purification material the excess lime treatment of water about 99.9% to 100%. The lime excess line l is the pH value of water making extremely alkaline.

7. __________ is used for spans ranging from 9 m to 15 m.

a) King post truss

b) Queen post truss

c) Coral truss

d) Roof truss

View Answer

Answer: b
Explanation: Queen post truss is used for spans 9 m to 15 m. It consists of principal rafters, common rafters, purlins. The queen posts are connected with the help of a straining beam.

8. __________ is provided to prevent the movement of the post due to loads in Queen post truss.

a) Purlin

b) Eaves board

c) Straining beam

d) Ridge beam

View Answer

Answer: c
Explanation: The queen posts are connected with the aid of straining been of the upper ends and by a straining sill at the lower end to prevent the movement of post due to loads. In this truss, the straining beam acts as a compression member. Whereas the queen post act as a tension member.

9. ___________ is a combination of king post truss and queen post truss.

a) Steel slope truss

b) Pratt truss

c) Mansard roof truss

d) Fan truss

View Answer

Answer: c
Explanation: Mansard truss is a combination of king post truss and queen post truss. This truss is used to obtain the maximum space for living purposes. The general height of the roof is comparatively kept low.

10. In mansard truss, the upper slope is _________

a) 45°

b) 30°

c) 60°

d) 90°

View Answer

Answer: b
Explanation: The mansard has two different slopes, the lower slope should not be steeper than 75° and upper

slope not greater than 30 degrees. The construction of the various joints is similar to the king post and queen post trusses.

11. _______ trusses are generally adopted for greater fans.

a) Timber

b) Cast Iron

c) Steel

d) AC

View Answer

Answer: c
Explanation: The Steel trusses are adopted for greater spans as the timber trusses become heavy and uneconomical. Steel trusses are much stronger than timber trusses and are more fire resisting and durable. They cannot be attacked by white ants.

12. Steel trusses are generally constructed with __________

a) Mild steel

b) HYSD steel

c) TMT steel

d) JSW steel

View Answer

Answer: a
Explanation: Generally, most of the Steel trusses are fabricated and constructed with mild steel. They consist of angles because the angle sections can effectively resist both compressive and tensile stresses.
advertisement

13. __________ consists generally of single or double angles.

a) Strut

b) Column

c) Pillar

d) Stanchion

View Answer

Answer: a
Explanation: Angles can be manufactured economically instead of T sections for rafters. Strut consists of generally single or double angles, one or two angles back to back can be used as a tie beam.

14. A queen closer is placed after ______ in the heading course.

a) Quoin header

b) Brick bat

c) Header

d) Stretcher

View Answer

Answer: a
Explanation: The length of queen closer is usually kept equal to thickness of the wall. A queen closer is placed after every quoin header in a heading course, when the thickness of wall is 200 mm or above.

15. The size of frog in bricks is ___________

a) 10×4×4 cm

b) 10×9×4 cm

c) 10×4×1 cm

d) 9×9×4 cm

View Answer

Answer: c
Explanation: The depression provided on the size of brick during its manufacture is called the frog. According to BIS, the size of the frog in brick is 10×4×1 cm. Frog reduces the weight of a brick, to lay conveniently.
Design of Columns

1. Eccentrically loaded columns have to be designed for combined axial and ________

a) Shear force

b) Bending moments

c) Torsion

d) Creep

View Answer

Answer: b
Explanation: When the line of action of the resultant force doesn't coincide with the axis of centre of gravity then it is called eccentrically loaded column. An eccentrically loaded column has to be designed for combined axial force and bending moments.

2. What is the recommended value of effective length if the column is effectively held in position and fixed against rotation in both ends?

a) 0.8 l

b) 0.5 l

c) 0.65 l

d) 0.9 l

View Answer

Answer: c
Explanation: Effectively held in position and fixed against rotation in both ends is 0.65 l.

End Positions Of a Column	Value of effective length
Effectively held in position and fixed against rotation in both ends	0.65 × l
Effectively held in position at both ends but not restrained against rotation	1.00 × l

3. What is the minimum value of eccentricity provided in columns?

a) 50 mm

b) 20 mm

c) 30 mm

d) 45 mm

View Answer

Answer: c
Explanation: No column can have a perfectly axial load. There may be some moments acting due to imperfection of construction or due to actual conditions of loading. Hence IS 456 -2000, recommend eccentricity of 20 mm.

4. The strength of the column with helical reinforcement shall be ____ times the strength of similar column with lateral ties.

a) 2.0

b) 1.05

c) 3

d) 1.5

View Answer

Answer: b
Explanation: The strength of column with helical reinforcement Shall be 1.05 times the strength of similar column with lateral ties, provided the ratio of the volume of helical reinforcement to the volume of the core shall not be less than 0.36(Ag/Ak – 1) fck/fy.

5. The minimum diameter provided for the longitudinal bars is ________

a) 15 mm

b) 20 mm

c) 12 mm

d) 18 mm

View Answer

Answer: c
Explanation: The minimum diameter of the longitudinal bars provided in the column is 12 mm and the spacing of longitudinal bars measured along the periphery of the column shall not exceed 300 mm.

6. What is the minimum number of longitudinal bars provided in the rectangular column?

a) 4

b) 5

c) 6

d) 8

View Answer

Answer: a
Explanation: According to IS 456-2000, clause 26.5.3, the minimum number of longitudinal bars to be provided is 4 for rectangular columns and the minimum number of longitudinal bars to be provided for circular columns is 6.

7. The ends of ________ shall be properly anchored.

a) Longitudinal reinforcement

b) Transverse reinforcement

c) Torsional reinforcement

d) Shear reinforcement

View Answer

Answer: b
Explanation: The effective lateral support is given by transverse reinforcement either in the form of circular rings or by lateral ties. The ends of transverse reinforcement shall be properly anchored.

8. For longitudinal reinforcing bar, the nominal cover should not be less than ___________

a) 30 mm

b) 20 mm

c) 40 mm

d) 50 mm

View Answer

Answer: c
Explanation: According to IS 456-2000, clause 26.4.2.1, the nominal cover for longitudinal reinforcing bars in any case shall not be less than 40 mm or less than the diameter of such bar.

9. Which of the following reservoirs is also known as ___________

a) Ground service reservoirs

b) Elevated reservoirs

c) Over head reservoirs

d) Storey reservoirs

View Answer

Answer: a
Explanation: Ground service reservoirs are constructed at ground level and mainly used to store water. They are generally constructed with masonry (or) RCC slab. These are also known as surface reservoirs or not elevated reservoirs.

10. A system in which water is supplied only for fixed few hours, such system is called ____

a) Closed

b) Intermittent

c) Combined

d) Lift

View Answer

Answer: b
Explanation: In the intermittent system, the water is supplied only for a few hours the system is adopted when adequate water from the source is not available. The system is widely adopted by much local water authority it is functioned through phases.

11. In ___________ system, air relief valves are not required.

a) Gravity

b) Intermittent

c) Continuous

d) Grid

View Answer

Answer: c
Explanation: In the continuous system, the supply of water is 24 hours a day. This is the most ideal system and is adopted when plenty of water is available. As the water doesn't get contaminated and circulating at uniform pressure, air relief valves are not required essentially.

12. Which of the following is one of the layouts of distribution systems?

a) Dual system

b) Gravity system

c) Grid Iron system

d) Pressure system

View Answer

Answer: c
Explanation: In grid iron systems, there are no dead ends hence stagnation of water and its consequences are eliminated. The water is kept in good circulation due to the absence of dead ends. The system is suitable for well planned towns.
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13. Which of the following system is also known as an interlaced system?

a) Tree system

b) Grid iron system

c) Circle system

d) Radial system

View Answer

Answer: b
Explanation: Grid iron system is an improvement over the tree system. In the system, the mains, sub lines and branches are interconnected with each other. This system is also known as interlaced or reticulation system.

14. Which of the following is also known as a ring system?

a) Circle

b) Reticulation

c) Radial

d) Interlaced

View Answer

Answer: a
Explanation: In a circle system, the entire locality is divided into either rectangular (or) circular blocks. The water mains are laid along the peripheral roads with sub mains branching out from mains. This system is also known as ring system.

15. Varignon's theorem is called as __________

a) Principle of Forces

b) Principle of moments

c) Principle of points

d) Theory of couple

View Answer

Answer: b
Explanation: Varignon's theorem states that "the moment of a force about any point is equal to the sum of moments of the components about the same point". This principle is also known as the principle of moments.
R.r = P.p + Q.c
Where P, Q are forces and R is resultant.
"c" is the perpendicular distance of Q.
Rankine's Theory of Column

1. ____________ formula can be used only for long columns.

a) Euler's

b) Rankine’s

c) Swift’s

d) Johnson’s

View Answer

Answer: a
Explanation: Euler’s formula is used only for long columns and $l/k > 80$ for mild steel columns.
Where l = effective length of column
k = radius of gyration.

2. In Euler’s formula, the column fails due to ___________ alone.

a) Shear

b) Torsion

c) Tension

d) Bending

View Answer

Answer: d
Explanation: In Euler’s formula, the column material is perfectly elastic, homogeneous, isotropic and obeys Hooke’s law. The self weight of column is ignorable and column fails due to buckling alone.

3. The ___________ joints are friction less.

a) Free

b) Pin

c) Roller

d) Fixed

View Answer

Answer: b
Explanation: A pinned joint offers resistance against horizontal and vertical movements but not against rotation. The deflection developed is zero ($y = 0$) and fixed ends are rigid.

4. ___________ formula is used for determining short as well as long columns.

a) Gilbert’s

b) Rankine’s

c) Johnson’s

d) Euler’s

View Answer

Answer: b
Explanation: The Rankine’s formula for crushing load = $P_{cr} = fA/1+€(l/k)^2$
Where; f = allowable crushing stress
A = area of cross section
K = least radius of gyration
€ = Rankine’s constant
• Rankine formula can be used for short columns as well as long columns.

5. _________ attached to a Framework suspended from the main structure.

a) Cantering

b) Shuttering

c) Bracing

d) Ceiling

View Answer

Answer: d
Explanation: A suspended ceiling attached to a framework suspended from the main structure. It provides a void between the underside of the main structure and ceiling. General it is provided to conceal the unevenness of roof.

6. __________ type of ceiling is adopted in modern hotels and auditorium.

a) Plaster board

b) Fibre board

c) Decorative

d) Joint less

View Answer

Answer: a
Explanation: Plaster board ceiling is adopted because of its ease of fixing and elimination of plaster mixer for the over head work. Plasterboard consists of gypsum plaster form in sheets 2.5 m × 0.75 m and compressed give strength.

7. Upper floor is also known as _________

a) Basement floor

b) Suspended floor

c) Supported floor

d) Rigid floor

View Answer

Answer: b
Explanation: Any floor above the level of ground floor is termed as upper or suspended floor. Floors are named as ascending order. The name of the building in respect of the storeys is governed by the number of floors it possess.

8. Paving is also known as ____________

a) Floor covering

b) Sub floor

c) Sub grade

d) Wearing course

View Answer

Answer: a
Explanation: The upper position of a floor structure consisting of base and topping is called floor covering or paving. The purpose of floor covering is to have a clean, smooth, non absorbent and durable surface.

9. __________ floors are used in modern residential and religious buildings?

a) Cement concrete

b) Terrazzo

c) Mosaic

d) Timber

View Answer

Answer: b
Explanation: Terrazzo floors consist of the terrazzo finish at top. Generally it consists of wearing layer of the terrazzo mixture about 6 mm thick laid on and under layer. It furnishes attractive and durable floor.

10. Scaffolding has to be done, if the height of structure is above __________

a) 1.2

b) 1.4

c) 1.5

d) 1.8

View Answer

Answer: c
Explanation: A temporary platform provided with necessary supports close to the work, provides limited space for the workers, building materials, tools etc. is termed as scaffolding. It is generally adopted for construction of masonry work above ground level 1.5 m.

11. _________ scaffolding is used where it is not possible to fix the standards into the ground.

a) Suspended

b) Cantilever

c) Steel

d) Brick layers

View Answer

Answer: b
Explanation: Cantilever scaffolding consists of platform supported by a series of cantilever or needle beams, passing through window openings or through holes left in the walls. They used it, when it is not possible to fix the standards into the ground.

12. ___________ scaffolding is used for light construction and finishing works.

a) Ladder

b) Brick layers

c) Mason’s

d) Suspended

View Answer

Answer: d
Explanation: Suspended scaffolding is cheap type and does not cause any obstruction on the ground. it is considered most effective as optimum level for working. It is used for finishing works like painting, distempering and whitewashing etc.
advertisement

13. The step with one or both ends rounded is known as __________

a) Point faced step

b) Soffit

c) Newel step

d) Bull nose step

View Answer

Answer: d
Explanation: The step with one or both ends rounded is known as Bull nose step. This type of step is generally provided at the bottom of a flight and remains always projecting beyond the face of the new post.

14. A step of uniform width is called filier.

a) True

b) False

View Answer

Answer: a
Explanation: A step of uniform width is called filier. This type of step is usually rectangular in plan. These steps are always preferred even at turning points of stair as they are safe for quick movement of the users.

15. The step of non uniform width is called ________

a) Post

b) Winder

c) Filier

d) Landing

View Answer

Answer: b
Explanation: The step of non uniform width is called as winder. These types of steps are usually triangle in plan. Such steps are only provided for changing the direction of a stair.
Rankine's Theory at Buckling Load and Crushing Load

1. Calculate the Euler's crippling load, if the effective length of column is 10 m take flexural rigidity as 6.14×10^{10} Nmm^2.

a) 6 kN

b) 8 kN

c) 10 kN

d) 12 kN

View Answer

Answer: a
Explanation: To find P:
$P = \pi^2 \times EI/L^2$
$P = \pi^2 \times 6.14 \times 10^{10} / 10000^2$
P = 6.055 kN ~ 6 kN.

2. A fine grained material is mostly ________

a) Homogeneous

b) Isotropic

c) Isomeric

d) Elastic

View Answer

Answer: b
Explanation: A material is said to be isotropic if at any point it has identical elastic properties in all directions. A fine grained material is mostly isotropic in nature.

3. The tangential force per unit area is _________

a) Shear strain

b) Shear stress

c) Modulus of rigidity

d) Torsion

View Answer

Answer: b
Explanation: The tangential force acting along the section of the body is termed as shear force and the stress in the section due to shear force is called shear stress and it is denoted by fs.

4. Which of the following is also known as pushing force?

a) Tensile stress

b) Compressive stress

c) Shear stress

d) Temperature stress

View Answer

Answer: b
Explanation: When an external force cause shortening of the body in the direction of the force it is termed as compressive force. The stress developed in the body due to the compressive force is called compressive stress.

5. Which of the following is also known as pulling force?

a) Tensile stress

b) Shear stress

c) Lateral stress

d) Axial stress

View Answer

Answer: a
Explanation: When an external force produces elongation of the body in its direction, it is termed as a tensile force. The stress developed in a cross section of the body due to a tensile force is called tensile stress.

6. Longitudinal strain is also known as ____________

a) Direct strain

b) Axial strain

c) Indirect strain

d) Shear strain

View Answer

Answer: a
Explanation: Direct strain is a measure of deformation produced by the application of the external forces. It is the ratio of change in dimension to the original dimension. It is also known as longitudinal strain.

7. Which of the following is also known as transverse strain?

a) Tensile strain

b) Compressive strain

c) Shear strain

d) Volumetric strain

View Answer

Answer: c
Explanation: Shear Strain is a measure of the angle through which a body is this distorted with applied forces.

Shear Strain is also known as the transverse strain.
Shear strain = ds/L.

8. The hooks law is valid only for _________

a) Uni axial forces

b) Bi axial forces

c) Tri axial forces

d) Lateral forces

View Answer

Answer: a
Explanation: Hooke's law: (Given by Sir Robert Hooke in 1678): stress is directly proportional to strain within limit of proportionality. It is valid for uniaxial force only.

9. Which of the following is also known as endurance limit?

a) Proportionality limit

b) Rupture limit

c) Elastic limit

d) Fatigue limit

View Answer

Answer: d
Explanation: The greatest stress applied an infinite number of times that a material can take without causing Failure is known as endurance or fatigue limit.

10. The ultimate strength in flexure is known as modulus of ________

a) Toughness

b) Rupture

c) Resilience

d) Hardening

View Answer

Answer: b
Explanation: The ultimate strength in flexure or torsion is known as modulus of rupture and the modulus of resilience is defined as the energy stored per unit volume at the elastic limit.

11. A material which ruptures with little or no plastic deformation is said to be ____________

a) Ductile material

b) Elastic material

c) Plastic material

d) Brittle material

View Answer

Answer: d
Explanation: A material is said to be brittle, if it ruptures with little or no plastic deformation and a material said to be ductile if it undergoes deformation without rupture.

12. The stress which is just sufficient to cause a permanent set is known as ___________

a) tenacity

b) ultimate stress

c) proof stress

d) working stress

View Answer

Answer: c
Explanation: Proof stress is a stress which is just sufficient to cause a permanent set equal to a specified percentage of the original gauge length. The stress corresponding to 0.2% of strain in the stress strain curve of mild steel is also known as proof stress.
advertisement

13. For engineering materials, the poison's ratio lies in the range of ___________

a) 0 and 1

b) -1 and 1

c) -2 and 2

d) 0 and 1/2

View Answer

Answer: d
Explanation: The ratio of lateral strain to the corresponding longitudinal or linear strain is called poison's ratio and it is denoted by 1 / m. The value of poison's ratio for elastic materials usually lies between 0.25 and 0.33 in no case the value doesn't exceed 0.5.

14. For ductile materials, the factor of safety is the ratio of yield stress to ___________

a) tenacity

b) ultimate stress

c) working stress

d) shear stress

View Answer

Answer: c
Explanation: Factor of safety,; for ductile materials, F.O.S = yield stress/Working stress
For brittle materials; F.O.S = ultimate stress / working stress.

15. A material having three mutually perpendicular planes of elastic symmetry is said to be _________

a) Isotropic

b) Autotrophic

c) Orthotropic

d) Anisotropic

View Answer

Answer: c
Explanation: If the material has three mutually perpendicular planes of elastic symmetry, then the material is said to be orthotropic material. The number of an independent constant is 9 in this case.
Rankine's Theory Due to Slenderness Ratio

1. Calculate the elongation of the cable due to load, if a steel cable of 2 cm diameter is used to lift a load of 500 π kg. Given that and the length of cable is 10 m and E = 2×10^6 kg/cm^2.

a) 0.5 cm

b) 0.3 cm

c) 0.25 cm

d) 0.4 cm

View Answer

Answer: c
Explanation: Change in length = Pl/AE = (500π)×(1000) / π × 2 × 10^6
Change in length = 0.25 cm.

2. A HYSD steel bar is 400 mm long. The lengths of the parts AB and BC of the bar is 200 mm each. It is loaded as P1 = 2000 kg and P2 = 1000 kg. Take diameter of AB as 2 cm and BC as 1 cm. The ratio of stresses in part AB to stresses in part BC is __________

a) 0.2

b) 0.75

c) 0.5

d) 1.5

View Answer

Answer: c
Explanation: The stress in AB = Pa/Aa = 2000/π/4 ×4 = the stress in BC = Pb/Ab = 1000/π/4 × 1
Pa/Pb = 2000/4 × 1000
= 0.5.

3. A retaining wall is related to _______

a) Plane stress

b) Plane strain

c) Normal stress

d) Normal strain

View Answer

Answer: b
Explanation: In a plane strain problem, the normal strain in the Z-direction. The shear strains must be zero. The normal strains may have non zero values. A retaining wall is the best example for plane strain problem.

4. _________ is a fix direction on the surface.

a) Bearing

b) Meridian

c) Graduated ring

d) Lift lever

View Answer

Answer: b
Explanation: Meridian is defined as a fix direction on the surface of the earth. The bearings of the survey lines are measured with reference to the meridians.

5. Which of the following is also known as geographical meridian?

a) True meridian

b) Arbitrary meridian

c) Magnetic meridian

d) Post meridian

View Answer

Answer: a
Explanation: True meridian is a line or plane passing through the true North Pole and South Pole, any point on the surface of the earth. It is also known as a geographical meridian. The direction of it through a point can be set by astronomical observations.

6. _________ changes with place and time.

a) Bearing

b) Magnetic bearing

c) True bearing

d) Arbitrary bearing

View Answer

Answer: b
Explanation: The magnetic bearing is a horizontal angle made by a survey line with reference to the magnetic meridian. The magnetic bearing changes with respect to place and time.

7. ___________ is provided to avoid undue wear and tear of pivot points.

a) Magnetic needle

b) Lifting pin and lever

c) Object vane

d) Break pin

View Answer

Answer: b
Explanation: A lifting pin is provided just below the object vane. When the object vane folded over to the glass cover, the lifting pin automatically presses the lifting lever as it avoids wear and tear of a pivot point.

8. ________ stops the oscillations of the graduated ring.

a) Brake pin

b) Eye vane

c) Object vane

d) Graduated ring

View Answer

Answer: a
Explanation: A brake pin is provided just at the base of the object vane. If pressed gently, it moves the spring brake inside the compass box, which stops the oscillation of the graduated ring.

9. The series of connected lines is known as ____________

a) Reinforcing

b) Traversing

c) Guniting

d) Bracing

View Answer

Answer: b
Explanation: The branch of surveying which involves a series of connected lines is known as traversing. The sides of the traverse are known as traverse legs. Traversing may be of two types, closed and open.

10. The time for which water is written in a settling tank is known as ________

a) Virtual time

b) Actual time

c) Detention time

d) Active time

View Answer

Answer: c
Explanation: Detention time is a time for which water is detained in the settling tank.
D.T = capacity of the task/rates of flow of a wave
= volume / discharge.

11. What is a detention time for mechanically cleaned tanks?

a) 2 to 3 hours

b) 2.5 to 4 hours

c) 1.5 to 3 hours

d) 4 to 6 hours

View Answer

Answer: c
Explanation: The velocity of flow can be reduced by increasing the area of flow and the detention time taken by a mechanically cleaned tank is 1.5 to 3 hours.

12. The rate of filtration for rapid sand filter is ___________

a) 3000 to 4500 lit/hr/m^2

b) 4500 to 6500 lit/hr/m^2

c) 3000 to 6000 lit/hr/m^2

d) 4500 to 7000 lit/hr/m^2

View Answer

Answer: c
Explanation: The efficiency of rapid sand filter is 95% the rate of filtration is large and ranges from 3000 to 6000 lit/hr/m^2 of filter area and size of unit is small.
advertisement

13. Which of the following processes is known as zeolite?

a) Demineralization process

b) Deionized water

c) Lime soda process

d) Base exchange process

View Answer

Answer: d
Explanation: Base Exchange process is also known as the zeolite or cation exchange process. In this process, the hard water is allowed to pass through a bed of zeolite sand (complex silicates of aluminium and sodium). This process is widely adopted.

14. The ratio of the yield of water from a rapid sand filter is __________

a) 10

b) 5

c) 15

d) 30

View Answer

Answer: d
Explanation: The efficiency of removal of bacteria by the rapid sand filter is 95% and the ratio of the yield of water from rapid sand filter is 30. The backwash arrangement is made only in case of a rapid sand filter.

15. __________ is a property of the free surface of a liquid.

a) Permeability

b) Surface tension

c) Capillarity

d) Specific gravity

View Answer

Answer: b
Explanation: The property by which the free surface of a liquid acts as a stretched membrane with a minimum surface area can be termed as surface tension.
Core Cross Section

1. Beams which are reinforced in both compression and tension sides are called as ________

a) Dual reinforced beam

b) Doubly reinforced beam

c) Composite beam

d) Additional beam

View Answer

Answer: b
Explanation: The beams which are reinforced in both compression as well as tension sides are known as doubly reinforced beams. These beams are generally provided when the dimensions of the beam are restricted.

2. Doubly reinforced beams are provided when Mu ______ M.

a) =

b) <

c) >

d) ~

View Answer

Answer: c
Explanation: The reinforced beams are generally provided when it is required to resist moment higher than the limiting moment of resistance of a singly reinforced section. The additional moment of resistance required can be obtained by providing compression reinforcement and additional tension reinforcement.

3. The doubly reinforced beams improve the _______ of the beam in earthquake regions.

a) Brittleness

b) Elasticity

c) Ductility

d) Toughness

View Answer

Answer: c
Explanation: Generally when the depth of beam is restricted due to architectural or any construction problems, the doubly reinforced beams are used. It reduces long term deflection and it also improves the ductility of the beam.

4. What is the stress in compression, if d'/d value is 0.1 for Fe415 steel?

a) 355 N/mm^2

b) 353 N/mm^2

c) 342 N/mm^2

d) 329 N/mm^2

View Answer

Answer: b
Explanation: The stress in compression, if d'/d value is 0.1 for Fe415 steel is 353 N/mm^2.

Grade of steel	d'/d value	fsc (in N/mm^2)
415	0.10	353
500	0.10	412

5. The cracks seen on walls are due to _____ failure.

a) Flexural

b) Compression

c) Shear

d) Torsional

View Answer

Answer: c
Explanation: The diagonal tension stress caused by shear and the combination of shear and bending is likely to cause the failure of the section by producing cracks in the walls.

6. Bending is accompanied by _______

a) Axial

b) Eccentricity

c) Shear

d) Torsion

View Answer

Answer: c
Explanation: Usually, the bending is accompanied by shear. The combination of shear and bending stresses produces the principal stress which causes diagonal tension in the beam section.

7. The variation of shear stress is ____________

a) Elliptical

b) Hyperbolic

c) Parabolic

d) Circular

View Answer

Answer: c
Explanation: In homogeneous beams, the variation of shear stress is parabolic.
• It is zero at top and bottom.
• It is maximum at a neutral axis.

8. What is the maximum shear stress for M20 grade concrete?

a) 2.5 N/mm^2

b) 2.8 N/mm^2

c) 3 N/mm^2

d) 3.5 N/mm^2

View Answer

Answer: b
Explanation: The maximum shear stress for M20 grade concrete is 2.8 N/mm^2.

Concrete Grade	M15	M20	M25	M30	M35
Max. Shear stress (N/mm^2)	2.5	2.8	3.1	3.5	3.7

9. _________ has to be provided against diagonal tensile stresses.

a) Longitudinal reinforcement

b) Shear reinforcement

c) Torsional reinforcement

d) Transverse reinforcement

View Answer

Answer: b
Explanation: Shear reinforcement has to be provided against diagonal tension stress caused by shear force. The inclined shear crack starts at the bottom and extends towards the compression zone.

10. Vertical stirrups are a form of ________ reinforcement.

a) Tension

b) Shear

c) Compression

d) Torsion

View Answer

Answer: b
Explanation: Generally the vertical stirrups are provided as two legged or four legged stirrups around the tension reinforcement. Hanger bars are provided to keep vertical steps in position otherwise they may get displaced while concreting.

11. The shear to be resisted by shear reinforcement is given by ____________

a) Vus = Vuc + Vu

b) Vus = Vu + Vuc

c) Vu = Vus – Vuc

d) Vus = Vu – Vuc

View Answer

Answer: d
Explanation: The shear to be resisted by shear reinforcement is given by
Vus = Vu – Vuc
Where: Vuc = shear resistance of concrete
Vu = ultimate shear force
▪ The number of stirrups cut by 45° crack line is n = d/Sv.

12. The shear resistance of bent up bars shall not exceed ___________ the total shear to be resisted.

a) 30 %

b) 50%

c) 40%

d) 25%

View Answer

Answer: b
Explanation: If the bent up bars or inclined stirrups are provided at spacing, the shear resistance of bent up Bar should not exceed 50% of the total shear to be resisted by the shear reinforcement. Because bent up bars alone (without stirrups) are not effective in preventing shear failure.
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13. What is the horsepower of the engine if the power is 219324 W.

a) 312

b) 268

c) 294

d) 304

View Answer

Answer: c
Explanation: The rate of doing work is known as power.
Horse power = P/746
= 219324/746
= 294 W.

14. A lift carry 10 persons each weighing 60 kg to the top storey of the building 100 m height. Calculate the potential energy acquired by the person.

a) 5.88×10^5 J

b) 4.32×10^5 J

c) 2.34×10^5J

d) 1.16×10^5J

View Answer

Answer: a
Explanation: Height of building = 100 m
Mass of each person = 60 kg
Mass of 10 persons = 600
Potential energy = mgh
= $600 \times 9.8 \times 10^5$
= 5.88 × 10 /5 J.

15. Calculate the maximum shear stress of a circular beam of 100 mm diameter, if the average shear stress is 0.63 N/mm^2.

a) 0.85 N/mm^2

b) 1.2 N/mm^2

c) 1.5 N/mm^2

d) 2.1 N/mm^2

View Answer

Answer: a
Explanation: For the circular section,
The maximum shear stress = 4/3 × average shear stress
= 4/3 × 0.6366
= 0.85 N/mm^2.

Failure due to Shear

1. Calculate the nominal shear stress, if a singly reinforced rectangular beam 230×450 mm effective depth is subjected to a factored load of 60 kN.

a) 0.6 N/mm^2

b) 0.55 N/mm^2

c) 0.4 N/mm^2

d) 0.25 N/mm^2

View Answer

Answer: a
Explanation: B = 230 mm; d = 450 mm
Shear force = Vu = 60 kN
Nominal shear stress = Vu/bd = 60 × 10^3/ 230 ×450
= 0.6 N/mm^2.

2. The minimum shear reinforcement is given by Asv/bSv = ________

a) 0.4 /0.87 fy

b) 0.5 /0.85 fy

c) 0.6 /0.9 fy

d) 0.35/ 0.6 fsc

View Answer

Answer: a
Explanation: The minimum quantity of shear reinforcement that should be provided for all beams except those of minor importance like lintels is given by IS 456:2000, clause 26.5.1.6 by the equation
Asv/bSv = 0.4/0.87 fy.

3. Bent up bars do not resist diagonal tension.

a) True

b) False

View Answer

Answer: b
Explanation: Some of the longitudinal bars can be bent up near supports as a bending moment to be resisted near the supports is very little. Such bent up bars resists diagonal tension effectively.

4. The ultimate shear force at a section of an RCC beam is 300 kN. The shear resisted by concrete is 77.5 kN.

What is the shear for which shear reinforcement is required?

a) 213.5 kN

b) 220 kN

c) 222.5 kN

d) 122.5 kN

View Answer

Answer: c
Explanation: Shear to be resisted by shear reinforcement is Vus = Vu – Vuc
Vus = Vu – Vuc; Where Vu = ultimate shear force and Vuc = shear resistance of concrete
= 300 – 77.5
= 222.5 kN.

5. Bond stress is a stress acting ____________ to the bar on the interface between reinforcement and concrete.

a) Perpendicular

b) Parallel

c) Normal

d) Transverse

View Answer

Answer: b
Explanation: Bond stress is the stress acting parallel to the bar on the interface between the reinforcing bar and the surrounding concrete hands it is stress developed between the contact surface of Steel and concrete.

6. _________ is developed due to adhesion between concrete and steel.

a) Shear

b) Flexure

c) Bond

d) Creep

View Answer

Answer: c
Explanation: Bond is developed due to the combined influential effect of adhesion between concrete and steel provided by concrete during setting.

7. Bond is developed due to __________

a) Viscosity

b) Gravity

c) Friction

d) Acoustics

View Answer

Answer: c
Explanation: The bond is developed due to the combined effect of friction which is provided by gripping of the bar due to shrinkage of concrete. It resists any force that tries to pull out the rods for the concrete.

8. ____________ depends on grade of concrete and diameter of bar etc.

a) Shear stress

b) Bond stress

c) Bending

d) Rupture

View Answer

Answer: b
Explanation: Bond stress depends on grade of concrete, diameter of the bar, bar profile condition nature of force in the bar, bends and hooks in a bar and grouping of bars.

9. Which of the following bond is also known as a local bond?

a) Anchorage bond

b) Fletched bond

c) Flexural bond

d) Composite bond

View Answer

Answer: c
Explanation: For transferring the change in bar force along its length due to the variation in bending moment free Irfan comes into account it is also known as a local bond.

10. ______________ bond arises when bar carrying certain force is terminated.

a) Anchorage

b) Flexural

c) Indemnity

d) Equivalent

View Answer

Answer: a
Explanation: An Anchorage Bond arises when a bar carrying certain force is terminated. In such cases, it is obligatory to transfer this force in the bar to the surrounding concrete over a certain length.

11. The development length can be determined easily by _______ test.

a) Push out test

b) Pull out test

c) Grading test

d) Slump cone test

View Answer

Answer: b
Explanation: The length of the bar required to transfer the force in the bar to the surrounding concrete through bond is known as development length. The development length can be easily determined by pull out test.

12. To improve the anchorage of bars ______ are provided in plain bars.

a) Standard hooks

b) Stirrups

c) Lateral ties

d) Standard bends

View Answer

Answer: a
Explanation: In situations where straight anchorage length cannot be provided due to lack of space, to improve the anchorage bars many times standard hooks are provided in plane bars.

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13. In case of HYSD bars ____________ are provided to increase anchorage length.

a) Lateral ties

b) Helical reinforcement

c) Standard hooks

d) Standard bends

View Answer

Answer: d
Explanation: Where straight anchorage length cannot be provided due to lack of space (at supports) In this situation, to improve the anchorage of bars many times the standard bends are provided in deformed bars.

14. Polar moment of inertia is denoted by ____________

a) G

b) J

c) K

d) M

View Answer

Answer: b
Explanation: The polar moment of inertia is the inertia of an area about an axis perpendicular to its plane. It is denoted by "J".
J = 2 I.

15. Calculate the moment of inertia of a hollow circular section whose external diameter is 60 mm and thickness is 5 mm about centroidal axis.

a) 315 m^2

b) 320 m^4

c) 330 m^4

d) 345 m^4

View Answer

Answer: c
Explanation: External diameter (D) = 60 mm
Internal diameter (d) = 50 mm
Ixx = Iyy = $\pi/64 \times (60^4 - 50^4)$.
= 330 m^4.

Rivet Joint

1. The effect of ____________ holes is to reduce the strength of connected plates.

a) Lap

b) Weld

c) Rivet

d) Butt

View Answer

Answer: c
Explanation: The effect of rivet holes is to reduce the strength of the connected plates. The strength of the plate or strength of rivet whichever is less is called the strength of the joint.

2. A cylinder section having no ___________ is known as seamless section.

a) Moment

b) Force

c) Strength

d) Joint

View Answer

Answer: d
Explanation: A seamless section is a section of the cylinder having no joint. No other section in a cylinder is as strong as seamless section of the same thickness and dimensions.

3. A water main of 1 m in diameter and 25 mm thick is subjected to an internal pressure of 2.5 N/mm2.

Calculate the longitudinal stress induced.

a) 20 N/mm^2

b) 25 N/mm^2

c) 30 N/mm^2

d) 35 N/mm^2

View Answer

Answer: b
Explanation: Longitudinal stress = fl = pd/4t
fl= 2.5 × 1000 / 4 × 25
fl = 25 N/mm^2.

4. What is the design Bond stress in plane bars intention for m25 grade concrete?

a) 1.2 N/mm^2

b) 1.4 N/mm^2

c) 2 N/mm^2

d) 3 N/mm^2

View Answer

Answer: b
Explanation: The design Bond stress in plane bars intention for m25 grade concrete is 1.4 N/mm^2.

Grade of concrete	M20	M25	M30
Design in (N/mm^2) bond stress	1.2	1.4	1.5

5. The value of design Bond stress in plain bars will increase in compression by ___________

a) 30%

b) 25%

c) 50%

d) 60%

View Answer

Answer: b
Explanation: The value of design bond stress will be increased by 25% in compression and for the deformed (HYSD bars) these values may be increased by 60%.

6. What is the anchorage value of standard "U" type hook?

a) 16 times the diameter of bar

b) 12 times the diameter of bar

c) 8 times the diameter of bar

d) 4 times the diameter of bar

View Answer

Answer: a
Explanation: The anchorage value of standard "U" type hook is 16 times the diameter of bar.

Type of hook / bend	U hook	45° Bend	90° Bend
Anchorage value	16 × diameter of bar	4 × diameter of bar	8 × diameter of bar

7. The flexural bond is __________ at the section.

a) Zero

b) Maximum

c) Minimum

d) Uniform

View Answer

Answer: b
Explanation: The flexural (local) bond is maximum at the section where the shear force is large. Therefore the check for flexural bond is necessary at the sections where shear force is maximum and bending moment is zero.

8. __________ reinforcement is designed for sections where the bending moment is maximum.

a) Torsional

b) Tension

c) Shear

d) Longitudinal

View Answer

Answer: b
Explanation: Tension reinforcement is designed for section where the bending moment is maximum. The bending moment varies along the span of a beam depending on the loading and support conditions.

9. In case of ___________ beams, the 50% of bars are curtailed at a distance of 0.5 ×l.

a) Simply supported

b) Cantilever

c) Continuous

d) Overhanging

View Answer

Answer: b
Explanation: According to the simplified rules for curtailment of bars, In case of cantilever beams, 50% of bars may be curtailed at 0.5 l or Ld which is more from the face of the support.

10. Splices are provided when the _________ bar available is less than that required.

a) Diameter

b) Length

c) Effective depth

d) Number of

View Answer

Answer: b
Explanation: Splices are generally provided when the length of the bar available is less than that of required. The splicing of reinforcement is provided by lap joint or mechanical joint on the welded joint.

11. Lap splices should not be used for bars larger than ___________ mm.

a) 24 mm

b) 42 mm

c) 54 mm

d) 36 mm

View Answer

Answer: d
Explanation: Lap splices should be used if and only if, the size of bars is less than 36 mm. For larger diameter, bars may be welded.

12. Cantilever slab is categorised based on support conditions.

a) True

b) False

View Answer

Answer: a
Explanation: Based on support conditions, the slabs are classified as
i. Simply supported slab
ii. Cantilever slab
iii. Fixed slab
iv. Continuous slab
v. Flat slab.
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13. According to IS 456: 2000; the span to depth ratio of a simply supported beam is ____________

a) 7

b) 20

c) 26

d) 32

View Answer

Answer: b
Explanation: As per clause 23.2 of IS 456 for spans not exceeding 10 m, this span to depth ratio should not exceed the limits given below
Cantilevers – 7

Simply supported – 20
Continuous – 26.

14. The __________ of the slab is governed by span to depth ratio.

a) Strength

b) Stiffness

c) Reinforcement

d) Stability

View Answer

Answer: b
Explanation: The term stiffness is defined as the ability to resist deformation. The stiffness of slabs is governed by span to depth ratio. It depends on the type of steel and the percentage of steel.

15. The material does not possessing any kind of elastic symmetry, then the material is said to be _______

a) Isotropic

b) Exo tropic

c) Anisotropic

d) Orthotropic

View Answer

Answer: c
Explanation: The material do not possessing any kind of elastic symmetry in them than the material is said to be anisotropic material or allotropic material. It has 21 elastic constants.
Rivet Lap Joint

1. What is the ratio of maximum deflection to maximum bending stress if a simply supported rectangular beam of span "L" and it carries a central load W.

a) $L^2/12$ Ed

b) $L^2/10$ Ed

c) $L^2/ 4$ Ed

d) $L^2/ 6$ Ed

View Answer

Answer: d
Explanation: Maximum deflection in simply supported beam is $y = Wl^2/48EI$
$y= Wl^3/48E\ (bd^3/1^2)$
$y/f = l^2/ 6Ed$.

2. In a cantilever of span subjected to a point load of w acting at a distance of (1/3) L from free end. The deflection under load will be

a) $WL^3/81$ EI

b) $14WL^3/ 81EI$

c) $8WL^3/81EI$

d) $WL^3/64$ EI

View Answer

Answer: c
Explanation: Deflection under load at B = W × $(2L/3)^3$/ 3EI
= $8WL^3$/81EI.

3. The slabs whose corners are prevented from lifting are known as __________

a) simply supported

b) cantilever

c) restrained

d) suspended

View Answer

Answer: c
Explanation: The slabs whose corners are prevented from lifting are called as restrained slabs. They may be supported on continuous or discontinuous edges.

4. As the corners are held down ____________ reinforcement has to be provided at the corners.

a) Tension

b) Shear

c) Torsional

d) Longitudinal

View Answer

Answer: c
Explanation: Against lifting, the corners are held down then torsional reinforcement has to be provided at the corners (at the discontinuous edge) to prevent cracking of corners.

5. Which of the following layout is used for "Direct- Indirect system".

a) Radial system

b) Grid system

c) Reticulated system

d) Interlaced system

View Answer

Answer: a
Explanation: The radial system is a reverse of the ring system, in this the water flows radially from one point to the outer periphery. The system is suitable where the roads are laid radially in the city.

6. _________ layout is best suited for well planned towns.

a) Tree system

b) Ring system

c) Reticulated system

d) Radial system

View Answer

Answer: b
Explanation: In the ring system, the entire locality is divided into either rectangular or circular blocks. The water mains are laid along the peripheral roads with submains branching out from the main mains. Thus, every point can receive the supply from two directions. This is obviously the most Ideal system.

7. A ___ is used to prevent water from flowing back in the opposite direction.

a) Sluice valve

b) Check valve

c) Air valve

d) Drain valve

View Answer

Answer: b
Explanation: Check valve is a valve which allows water to go in one direction only. The wall prevents the passage of water in the reverse direction. This valve is also known as Reflux valve.

8. Scour valve in water distribution system is provided at ________

a) High points

b) Junction points

c) Low points

d) Key points

View Answer

Answer: c
Explanation: Scour valves are the ordinary valves which can be operated manually. These are similar to drain valves. These are located at the depressions and low ends to remove the accumulated silt.

9. ________ valves are known as "Washout " valves.

a) Drain valves

b) Scour valves

c) Check valves

d) Sluice valves

View Answer

Answer: a
Explanation: These are called as drain valves. They are provided at all dead ends and depressions of pipelines to drain out the wastewater. These are ordinary walls operated by hand.

10. Check valve is provided on the delivery side of a pipe.

a) False

b) True

View Answer

Answer: b
Explanation: Check valve and pressure relief valves are provided on the delivery side because the reflux valve prevents the passage of water in a reverse direction. It allows the water to flow only one direction.

11. _____ reduces the pipe size from larger to smaller bore.

a) Aqua phone

b) Tee

c) Elbow

d) Reducer

View Answer

Answer: d
Explanation: The component in the pipeline which reduces the pipe size from larger to smaller bore is known as reducer. Usually, there are two types of reducers: 1. concentric reducers 2. eccentric reducers.

12. The maximum pressure in (kg/cm^2) to which cast iron pipes may be subjected is _________

a) 3

b) 7

c) 11

d) 14

View Answer

Answer: b
Explanation: Cast iron pipes are widely used in water supply and sewage systems. They possess high durability, strength & resistant to corrosion etc. They are available in 1000 – 1200 mm in diameter. They can withstand upto a temperature of 7 kg/cm^2.
advertisement

13. The pipe extending from a stop cock to the storage tank is called ________

a) Supply pipe

b) Service pipe

c) Street main

d) Distribution pipe

View Answer

Answer: a
Explanation: The pipe which is subjected to water pressure from the water main is called the supply pipe. The pipe extends from the stop cock up to the bib cock or entrance of the storage tank.

14. Calculate the elongation of the rod if you still out of 490 mm square area and 600 M long are subjected to an axial pull of 40 kN. Take $E = 2\times10^5 N/mm^2$.

a) 0.56 mm

b) 0.78 mm

c) 0.24 mm

d) 0.16 mm

View Answer

Answer: c
Explanation: Given that l = 600 mm, P = 40 kN.
The Elongation = Pl / AE
$= 40000 \times 600 / 490 \times 2\times10^2$
= 0.24 mm.

15. The ratio of change in thickness to original thickness is known as ___________

a) Lateral strain

b) Linear strain

c) Longitudinal strain

d) Volumetric strain

View Answer

Answer: a
Explanation: The lateral deformation per unit original lateral dimension is called a lateral strain. When a material is subjected to uniaxial stress within elastic limit it not only deforms longitudinally but also laterally.
Strain Energy

1. Resilience can also be termed as ____________

a) Stress energy

b) Strain energy

c) Modulus

d) Tenacity

View Answer

Answer: b
Explanation: The capability of a material to absorb energy when it is deformed elastically and release that energy upon unloading is known resilience. This resilience is also termed as Strain energy.

2. Mathematically, strain energy = _________

a) Power

b) Work done

c) Young's Modulus

d) Energy

View Answer

Answer: b
Explanation: By the principle of work, the amount of strain energy in a body is found. When a load acts on a body there will be deformation, which causes movement of the applied load. This work is done by the applied load.

3. Calculate the Strain energy stored in a body of stress 0.0366 N/mm^2. The cross sectional area is 60 $m^2$and length of body is 1 m. Take E = 2×10^5 N/mm^2.

a) 0.2009 N.mm

b) 0.0416 N.mm

c) 0.0987 N.mm

d) 0.1316 N.mm

View Answer

Answer: a
Explanation: Given that : l = 1000 mm ; A = 60000 mm^2; f = 0.0366 N/mm^2.
Strain energy stored = $f^2/2EI \times$ Volume
= $(0.0366)^2/\ 2\times2\times10^5\times$ (200×300) × (1000)
= 0 2009 N.mm.

4. What are the units of measurement for wooden and steel trusses?

a) 1 RM

b) 1 N.o

c) m^2

d) m

View Answer

Answer: b
Explanation: The units of measurement for wooden and steel trusses is 1 N.o

Description of work	Units of measurement

Earth work excavation	1 m^3
Steel reinforcement	1 kN
Wooden and steel trusses	1 No

5. Which of the following methods is also known as individual wall method?

a) Centre line method

b) Alignment method

c) Long wall and short wall method

d) Voluminous method

View Answer

Answer: c
Explanation: Long wall short wall method is tedious and long lasting. In this method, the length of wall running in one direction are measured first out to out and that of running in the perpendicular direction are measured in to in.

6. Centre line method is accurate method.

a) False

b) True

View Answer

Answer: b
Explanation: The estimates can be prepared quickly by using center line method. This is not only an accurate method but also a very quick method.

7. ________ gives the nature and class of work.

a) Estimate

b) Specifications

c) Tenders

d) Survey

View Answer

Answer: b
Explanation: Drawings cannot give every information about materials and quality. The specifications give the nature and class of work, quantity of materials and workmanship. They are very useful during the execution of work.

8. In foundation concrete, coarse aggregate size should be ___________

a) 20 mm

b) 30 mm

c) 40 mm

d) 50 mm

View Answer

Answer: c
Explanation: Generally foundation concrete is laid about thickness of 30 cm with proportion 1:4:8 (or) 1:5:10

and are measured in m^3.
Before laying the concrete bed level, sand filling and sinking must be done and checked properly.

9. What is the painting coefficient for flush doors?

a) 2.3

b) 2.4

c) 3.4

d) 3.6

View Answer

Answer: b
Explanation: The painting coefficient for flush doors is 2.4.

Description	Multiplying factor of Paint coefficient
Fully glazed doors	1.6
Fully ventilated doors	3.6
Flush doors	2.4

10. Which of the following rules is known as "Prismoidal Rule"?

a) Mean sectional rule

b) Trapezoidal rule

c) Simpson's rule

d) Mid sectional rule

View Answer

Answer: c
Explanation: Prismoidal rule is used when the shape of the solid between two parallel cross sections is in the shape of a prismoid. This is also known as Simpsons rule volume is calculated by
V = L/6 (A1 + 4A + A2).

11. Which of the following estimates is also known as a preliminary estimate?

a) Detailed estimate

b) Scientific estimate

c) Approximate estimate

d) Abstract estimate

View Answer

Answer: c
Explanation: An approximate estimate is prepared to decide whether the funds available for the proposal is sufficient or not. The estimate is accompanied by a detailed report explaining the necessity and utility of the proposal.

12. Service unit method is related to ____________ estimate.

a) Abstract

b) Approximate

c) Detailed

d) Cubic content

View Answer

Answer: b
Explanation: There are over a number of methods available for preparing approximate estimate but the following methods are important
i. Plinth area method
ii. Cubic content method
iii. Service unit method.
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13. By ___________ estimate, a technical sanction is obtained.

a) Approximate

b) Detailed

c) Abstract

d) Preliminary

View Answer

Answer: b
Explanation: Detailed estimate is required for arranging the contract and entering into the agreement. In this estimate, the quantities are worked out in the order in which construction proceeds. For getting technical sanction, the detailed estimate is prepared.

14. Which of the following is an exact estimate?

a) Abstract

b) Detailed

c) Rough

d) Preliminary

View Answer

Answer: b
Explanation: In a detailed estimate, the quantities of each item of work such as earth excavation, bed concrete and brick masonry are calculated. Detailed drawings are required for this estimate.

15. Calculate the instantaneous elongation if a steel rod of 40 mm and 4 m long subjected to an axial pull of 80 kN. Take $E = 2\times10^5$ N/mm^2.

a) 1.23 mm

b) 1.27 mm

c) 1.31 mm

d) 1.43 mm

View Answer

Answer: b
Explanation: An instantaneous elongation = f/A × L ; and f = P/A = 80000/1256.63 = 63.66 N/mm^2.
= 63.66/1256.63 × 4000
= 1.27 mm.